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EFFECT OF SOME COMMERCIAL FERTILIZER LEVELS ON THE VEGETATIVE GROWTH, FLOWERING AND CHEMICAL COMPOSITION OF CINERARIA (*Senecio cruentus*) PLANTS.

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ABSTRACT

Pot experiment was carried out to study the effect of different commercial fertilizer levels on the growth, flowering and chemical composition of cineraria (*Senecio cruentus*) plants, during the two successive seasons 2005 and 2006.

The experiment was designed to investigate the effect of commercial fertilizers Super- Feed, Stimufol and Kristalon, each added at 0.0, 1.0, 2.0 and 3.0 g /L, every 2 weeks throughout the period of study as soil drench.

The results showed that Kristalon fertilizer application at 3 g/ L significantly increased the growth parameters, represented as plant height, number of leaves per plant, root length, fresh and dry weights of shoots and leaves. Flowering parameters, i.e. number of flowers per plant and inflorescence diameter markedly increased by the application of Super-Feed fertilizer at 3 g /L. Super-Feed fertilizer at 3 g /L produced a significant increase in fresh and dry weight of roots. Meanwhile, Stimufol application at 3 g/ L increased the number of shoots / plant and fresh and dry weights of flowers, in both seasons.

The chemical analysis proved that N%, P% and K % were increased in the leaves of cineraria plants when the Kristalon fertilizers was applied at 3.0 g / L , whereas the highest percentage of chlorophyll (a) and (b) was obtained from the plants which received Super-Feed fertilizer at 3.0 g/L.

INTRODUCTION

Cineraria (*Senecio cruentus* L), belongs to Family *Asteraceae*, is one of the most important and popular flowering pot plants which has a good market demand in Egypt, beside being used for outdoor decoration. The florist's cineraria are grown as an annual and bloom from spring to early summer. The large bouquet of daisy – like flowers surrounded by dark – green leaves makes this a very showy flowering pot and popular plant. Moreover, the other available flowers in a wide range of colors are useful for decorative beauty with cineraria flowers (Woods, 1992).

Most plants require proper nutrition if they are to survive and must be supplied frequently with sufficient amounts of fertilizers to keep them healthy with super quality.

Generally, lack of any element of nutrition will reduce growth and ultimately will cause plant death. Problems of adequate fertilization are extremely complex and affecting the production and the quality of flowering plants. Nutrition and fertilization of flowering plants have been reported by many investigators; Rajamani and Sundaram (1997) on *rose* cv. Happiness, reported that application of N:P:K at 75:150:50 g/plot gave the highest number of flowers with stems of 60 and 90 cm (10.78 and 5.87, respectively) and the highest total number of flowers per plant was 35.5. Mahros (2000) on

Aster novi-belgii, stated that application of N: P: K (5:5:5) stimulated vegetative and root growth, increased number and weight of inflorescences but delayed flowering. Atta-Alla *et al*. (2003)on gladiolus found that the application of NPK fertilizers, especially at the highest rate (3.0 g/plant), significantly increased leaf number, fresh and dry weights of leaves and spikes, increased number of florets per spike, spike length, number of new cormels per plant, and fresh weight of cormels and corms**.** Also**,** Khan and Iftikhar (2004) obtained the maximum growth from *Gladiolus hortulanus* cv. Wind Song when the plants were supplied with 10:10:5 g NPK/pot, whereas spike emergence, opening of first and last floret, corm diameter and corm weight were at maximum with 5:5:5 g NPK/pot.

On the other hand, the positive effects of fertilization on the growth of various ornamental plants have been reported by Zaharia (1997) on *Asparagus plumosus*, Saleh *et al*., (1998) on *Ficus benjamina*, El-Ashry *et al*., (1999) on *Pelargonium grandiflorum*, Minuto and Devecchi (2004) on cyclamen and geranium, and by Kumar and Natarajan (2006) on marigold.

The objective of this study is to investigate the effect of different doses of some commercial fertilizers as Super Feed, Stimufol and Kristalon on the vegetative growth, flowering and chemical composition of cineraria.

MATERIALS AND METHODS

This study was carried out at the experimental farm of faculty of the Agriculture, Suez Canal University, during the two successive seasons 2005 and 2006.

Seeds of cineraria (*Senecio cruentus* L) were sown on the beginning of September of each year in pots containing 1:1 (v/v) mixture of sand and peatmoss. One month after sowing (October) the healthy and uniform seedlings were carefully selected and potted off singly into clay pots of 10 cm diameter, filled with the same medium used for germination. Four weeks later, the plants were transplanted into 25 cm pots, filled with 1: 1 (v/v) mixture of Loam and sand. Two weeks after transplanting, plants were fertilized by Super Feed, Stimufol and Kristalon (Table A) as soil drench with 500 ml solution / pot every 2 weeks throughout the period of study. All these commercial fertilizers were applied at the concentration of 0.0, 1.0, 2.0 and 3.0 g /L. The layout of this experiment was a complete randomized design, using 9 treatments and control, each replicated four times and each replicate contained 6 plants (Plots).

At full flowering stage (on March) of both seasons, data were recorded on plant height (cm), number of shoots, leaves and flowers per plant, root length, diameter of inflorescence (cm), fresh and dry weights of leaves, shoots, roots and flowers.

Nitrogen, phosphorus and potassium percentages were determined in the dry leaves. Nitrogen and phosphorus percentages were estimated calorimetrically as described by Allen (1959) and Jackson (1962), respectively. Potassium percentage was determined by flame photometer according to the method mentioned by Brown and Lilleland (1964). Chlorophyll (a) and (b) were determined according to Mazumdar and Majumder (2003).

Table (A): Chemical composition of tested commercial fertilizers.

Traditional name	N%	P%	K%	Mg ppm	Mn ppm	Zn ppm	Fe ppm	B ppm	Mo ppm	Cu ppm
Super Feed	19	19	19	10000	500	300	1000	200	50	100
Stimufol	25	16	12	200	850	300	1700	440	10	850
Kristalon	19	19	19	400	----	----	-----	250	10	100

Data were computed and statistically analyzed using SAS program (SAS, 1985) and means of treatments were separated by using LSD test according to Gomez and Gomez (1984).

RESULTS AND DISCUSSIONS

1-Effect of several commercial fertilizers on vegetative growth of cineraria (*Senecio cruentus* L):

Data in Table (1) show clearly that the application of Kristalon fertilizer significantly increased plant height as compared to Super-Feed, in the first season and Stimufol fertilizers, in both seasons. Meanwhile, in the second season, Kristalon fertilizer markedly increased plant height compared to Super-Feed. The tallest plants recorded 26.19 cm and 26.56 cm, resulted from plants fertilized with Kristalon in first and second seasons, respectively.

Data in the same Table indicated that no differences between the tested commercial fertilizers on the number of shoots / plant in both seasons.

Data in Table (1) demonstrate that using tested commercial fertilizers markedly increased the number of leaves / plant in the first season. Meanwhile, in the second season Kristalon fertilizer significantly increased the number of leaves / plant to 24.50, as compared to Stimufol fertilizers which gave 21.56 leaves / plant.

Concerning the root length as shown in Table (1) data indicates that when plants were fertilized by Kristalon the length increased. The increases were significant in both seasons when compared with other fertilizers. Similar results showing the effect of Kristalon fertilizer on increasing the root length were reported by Zaghloul and Moghazy (1998) on *Nerphrolepis exaltata* who found that the application of Kristalon increased the root length.

Data of fresh and dry weight of shoots, as affected by commercial fertilizers are presented in Table (1). In both seasons, the data revealed that Kristalon was the best commercial fertilizer in producing the heaviest fresh and dry weight of shoots as 24.72 gm and 5.17 gm, respectively in the first season and 25.90 gm and 5.24 gm, respectively in the second season, compared with other treatments.

Kristalon fertilizer influenced the fresh and dry weight of leaves, in both seasons, where it significantly increased the fresh and dry weights of leaves compared with other fertilizers (Table1).

As for fresh and dry weight of roots, data in the same Table (1) indicated that using Kristalon fertilizer markedly increased the fresh and dry weight of roots of cineraria when compared with other fertilizers. This was true in both seasons.

T1

Regarding the effect of concentrations of commercial fertilizers on vegetative characters of cineraria (Table 2), it was observed that plant height, was progressively increased with increasing fertilization concentration. It is clear that the rate of 3 g/L was more effective in stimulating vegetative growth.

Stimulating growth of cineraria by NPK fertilizers could be attributed to the distinguish role of these nutrients in plant metabolism. Nitrogen play a vital role in growth and development, it is required for production of proteins used in the formation of protoplasm for new cells. It has an essential role in chlorophyll establishment and consequently its stimulation effect of photosynthesis process in leaves. Phosphorus is very important for carbohydrate transformation due to a multitude of phosphorylation reactions and the energy rich phosphate bond. Also, phosphorus is a constituent of the cell nucleus and essential for cell division and for the development of meristem tissue. Potassium is necessary in respiration, carbohydrate metabolism through its effect on photosynthesis and plays a great role in translocation of carbohydrate from leaves to root system. It also regulates the water content in the cytoplasm of cell. (Marschner, 1995).

The results in Table (2) show that the high rate of fertilization (3g/L) gave 9.58 and 9.25 shoot / plant, in the first and second seasons, respectively compared with 3.50 and 4.50 shoot / plant, with control plants. The increase in the number of shoots / plant on the plant treated with the high rate of fertilization over the control plant amounted 173.7% and 105.6%, in both seasons, respectively, indicating that fertilization encourage the vegetative growth of cineraria . These results are in agreement with Hossain *et al.*, (2001), on *Capsicum annuum,* and Atta- Alla (2003) on cineraria plants who found that number of branches per plant, was significantly affected by fertilizer rates.

As for number of leaves, data in Table (2) show that treating plants with the high rate of fertilization (3g/L) significantly increased the number of leaves / plant as compared with lower levels and control. The greatest number of leaves/ plant was 35.0 and 35.5 leaves/plant, resulted from plants fertilized with 3g /L, in the first and second seasons, respectively.

Comparing the effect of fertilizer concentration, it was noticed that the high level of fertilization (3g/L) increased root length as compared with control. In this case the root length was 24.43 cm compared with 11.50 cm for control plant, in the first season. In the second season root length was 24.67 cm compared with 10.17 cm for untreated plants. The increase in this concern was significant in both seasons.

Generally, the increase in root length could be due to the reflection of the better vegetative growth of treated plants. Similar finding were reported by Pool and Conover (1992) on *Codiaeum varigatum* and Abou Dahab (1996) on *Brassaia arboricola,* who found that fertilization increased the root length.

As for fertilizer concentrations, the heaviest fresh and dry weight of shoots (35.02 gm and 7.83 gm) were obtained from plants fertilized with 3 g/L in the first season as compared to control (10.36 gm and 2.18 gm). The differences between fertilizer concentrations were significant in both seasons (Table 2).

T2

The increase in vegetative weight may be attributed to the increase in plant height of treated plants. These results are in agreement with Abou Dahab (1996) on *Brassaia arboricola,* who found that the application of fertilizers increased fresh and dry weight of stems. Similar results were also reported by Hossain *et al.*, (2001), on *Capsicum annuum* and Atta- Alla (2003) on cineraria plants.

As for fertilizer concentration effects, data in Table (2) demonstrate that the high concentration (3g/L) gave the heaviest fresh and dry weight of leaves as 76.06 gm and 10.17 gm and 76.94 gm and 10.27 gm in first and second season respectively.

In this concern, Sumbak (1970) reported that fertilization caused an increase in leaf cell number and cell size which reflected on increasing leaf production. This might be attributed to its positive effect on protein synthesis. Similar resulted were reported by Mahros (2000) on *Aster novi-belgii L* and Atta-Alla *et al*., (2003) on gladiolus .

Data in Table (2) show significantly that the heaviest fresh and dry weight of roots was obtained from plants fertilized with the rate of 3 g / L. This treatment gave 29.57 gm and 8.54 gm fresh and dry weight, respectively, compared to 9.85 gm and 2.61 gm only for control in the first season and gave 30.97 gm and 9.02 gm, compared to 9.92 gm and 2.36 gm for control in the second season.

Concerning the interaction effects between fertilizer types and concentrations of commercial fertilizers on plant height of cineraria (Table 3), it was noticed that the combination of Kristalon fertilizer at the highest rate (3g/L), significantly increased plant height compared to control in both seasons.

The fertilization with NPK improves plant growth and provides plants with their requirements of essential elements needed for growth. The importance of fertilization for plant has been reported and recommended by many investigators such as El-Ashry *et al*., (1999) on *Pelargonium grandiflorum*, Atta-Alla (2003) on *Senecio cruentus* and Khan, and Iftikhar (2004) on *Gladiolus hortulanus.*

Results of the interaction in Table (3) also indicated that the most increases in the number of shoots / plant resulted from plants fertilized with Stimufol and Super-Feed at 3g/L, in the first season compared with control.

Regarding number of leaves/plant, in both seasons, the interaction of fertilizers type and concentration was significant and the highest number of leaves was associated with the highest rate of Kristalon as 3g /L. The number of leaves / plant for this treatment was 37.50 and 38.75 leaves / plant compared to 9.0 and 12.50 leaves / plant for the control, in the first and second seasons, respectively.

Generally using all commercial fertilizers increased considerably number of leaves/plant over control. Such increase may be due to the effect of these fertilizers on increasing plant height and the metabolites required for increasing leaf formation. Similar results were obtained by El-Sayed (1994) on *Asparagus sprengerii*, Zaghloul and Moghazy (1998) on some ornamental foliage plants, Atta-Alla *et al*., (2003) on gladiolus and Khan and Iftikhar (2004) on *Gladiolus hortulanus* since they found that application of NPK fertilizers especially at the highest rate significantly increased the leaf number.

Data in Table (3) show that the most promising effect of interaction of fertilizers × concentration is noticed with the combination of Kristalon fertilizer and the high concentration (3g /L). This treatment gave the tallest root as compared with any other treatment, in both seasons, where it gave 27.25 cm and 27.50 cm root length, in both seasons, compared to 11.50cm and 10.50 cm, respectively, for control plants.

The interactions between fertilizers types and concentrations presented in Table (3) demonstrate that Kristalon fertilizer at any level application significantly increased the fresh weight of shoots when compared with most other treatments and control. However, the increase was more obvious with the high level of fertilizer (3 g/ L) which produce 40.51 gm and 41.89 gm compared to 10.29 gm and 14.36 gm with control in first and second seasons respectively. Meanwhile, the Super-Feed fertilizer at 3 g /L gave the heaviest dry weight of shoots in both seasons. In this case the dry weight was 9.09 gm and 9.17 gm compared to 1.88 gm and 1.71 gm with the control plant in the first and second seasons respectively.

As for fresh and dry weight of leaves, in both seasons, the interaction between fertilizers type and concentrations was significant in most cases. The heaviest fresh and dry weights of leaves, in both seasons, were found with Kristalon fertilizer at the rate of 3 g/ L. In the first season, this interaction produced 93.36 gm and 13.59 gm of fresh and dry weights of leaves/plant compared with 25.17 gm and 3.26 gm, for the control plant, respectively, (Table3).

Concerning the interaction effects on the fresh and dry weight of roots of cineraria, data in Table (3) indicated that the combination of Super-Feed fertilizer and the highest rate (3g /L) induced a significant increase in fresh and dry weight of roots as compared with all other treatments.

2- Effect of some commercial fertilizers on the flowering parameters of cineraria (*Senecio cruentus* L):

Data in Table (4) indicated that Super-Feed fertilizer significantly increased the number of inflorescence / plant when compared with the other two fertilizers. This treatment gave the maximum number of flowers as 84.25 in the first season and 88.13 in the second season. This was followed by Kristalon than Stimufol.

Regarding inflorescence diameter, data in Table (4) clearly show that the application of Super-Feed fertilizer markedly increased inflorescence diameter (cm) in first season and significantly increased it, in the second season.

As for Fresh and dry weight of inflorescence data in Table (4) indicated that Stimufol fertilizer significantly increased inflorescence fresh weight compared to other treatment of fertilizers, in both seasons. Meanwhile, the Stimufol fertilizer significantly increased dry weight of inflorescence compared with Kristalon fertilizer, and slightly increased it, compared with Super–Feed fertilizers, in both seasons.

Concerning the effect of fertilizers rate, it is clear from the same Table that the high concentration of fertilizers (3g/L) significantly produced the largest number of inflorescence / plant.

Table (4) Effect of some commercial fertilizers on flowering parameters of Senecio *cruentus* L, during the two successive seasons of 2005 and 2006.

Fertilizer	Number of inflorescence / plant	Inflorescence diameter (cm)	Fresh weight of inflorescence (gm)	Dry weight of inflorescence (gm)
First season (2005)				
Super-Feed	84.25	17.56	28.95	5.63
Stimufol	69.38	17.00	30.72	5.68
Kristalon	72.81	16.56	24.50	4.94
L.S.D (5%)	**3.13**	**NS**	**1.48**	**0.26**
Second season (2006)				
Super-Feed	88.13	18.94	29.64	5.79
Stimufol	70.88	17.44	31.50	5.92
Kristalon	72.63	16.81	24.71	4.94
L.S.D (5%)	**3.39**	**1.50**	**1.95**	**0.36**

Increasing the flowering tested parameters as a result of using NPK fertilizers was reported by El- Gendy *et al*., (1995) who stated that highest level of NPK had the most significant effect on increasing number of flowers of *Begonia semperflorens*. Also, Rajamani and Sundaram (1997) on *rose* cv. Happiness, Vrsek *et al.,* (2002) on *Aster novi-belgii L* and Atta– Alla (2003) on cineraria they reported that significantly more flowers were produced on plants supplied with fertilizers than those without fertilizers.

With respect to the effect of fertilizer concentration on the inflorescence diameter, data in Table (5) revealed that the highest rate of fertilizer (3g/L) significantly increased the inflorescence diameter, compared with control, in both seasons. This treatment increased the inflorescence diameter to 22.0 cm and 22.83 cm compared with 11.50 cm and 12.83, cm only for control, in the first and second seasons, respectively.

The recorded data in Table (5) also indicated that the high concentration of commercial fertilizer (3g/L) significantly increased the inflorescence fresh and dry weights compared with the untreated plants.

Increasing the flowering fresh and dry weight of flowers as a result of using NPK fertilizers was reported by Mahros (2000) on *Aster novi-belgii L,* Atta–Alla (2003) on cineraria and Atta-Alla *et al*., (2003) on gladiolus where they pointed out that the application of NPK fertilizers especially at high rate (3.0 g/plant) significantly increased the fresh and dry weights of spikes.

As for interaction effect data in Table (6) show that the combination of Super-Feed fertilizer and the highest tested concentration (3g/L), produced a significant increase in number of inflorescence /plant, in both seasons. The number of inflorescence / plant for this treatment was 128.25 and 132.0 flowers /plant, compared with 36.0 and 45.0 flowers/plant for control plants, in the first and second seasons, respectively. The increase in the number of inflorescence / plant in this treatment amounted 256.25 % and 193.33 % in the first and second season respectively.

Table (5) Effect of concentration of some commercial fertilizers on flowering parameters of *Senecio cruentus* L, during the two successive seasons of 2005 and 2006.

Concentration g/L	Number of inflorescence / plant	Inflorescence diameter (cm)	Fresh weight of inflorescence (gm)	Dry weight of inflorescence (gm)
First season (2005)				
0	39.33	11.50	14.79	2.69
1	68.75	15.92	25.10	4.57
2	83.42	18.75	32.23	6.17
3	110.42	22.00	40.12	8.22
L.S.D (5%)	**3.62**	**1.43**	**1.71**	**0.30**
Second season (2006)				
0	42.33	12.83	16.11	2.91
1	67.92	16.92	24.36	4.46
2	84.58	18.33	32.47	6.22
3	114.0	22.83	41.52	8.60
L.S.D (5%)	**3.92**	**1.73**	**2.25**	**0.42**

Table (6) Effect of interaction of fertilizers and concentrations on flowering parameters of *Senecio cruentus* L, during the two successive seasons of 2005 and 2006.

Fertilizer	Concentration g/L	No. of flowers / plant	Inflorescence diameter (cm)	Fresh weight of flowers (gm)	Dry weight of flowers (gm)
First season (2005)					
Super-Feed	0	36.0	10.0	15.35	2.70
	1	73.50	16.50	24.34	4.68
	2	99.25	20.0	35.16	6.98
	3	128.25	23.75	40.97	8.16
Stimufol	0	40.0	12.0	13.04	2.29
	1	67.0	15.75	29.84	5.13
	2	73.25	17.75	32.56	5.60
	3	97.25	22.50	47.43	9.69
Kristalon	0	42.0	12.50	15.99	3.08
	1	65.75	15.50	21.11	3.92
	2	77.75	18.50	28.96	5.94
	3	105.75	19.75	31.96	6.81
L.S.D (5%)		**6.26**	**2.48**	**2.96**	**0.52**
Second season (2006)					
Super-Feed	0	45.0	15.0	15.81	2.78
	1	75.25	17.50	25.07	4.81
	2	100.25	19.0	36.24	7.15
	3	132.0	24.25	41.44	8.41
Stimufol	0	42.0	12.0	17.24	3.29
	1	65.0	16.75	28.15	4.84
	2	73.75	17.0	30.96	5.36
	3	102.75	24.0	49.65	10.18
Kristalon	0	40.0	11.50	15.29	2.67
	1	63.50	16.50	19.88	3.72
	2	79.75	19.0	30.20	6.15
	3	107.25	20.25	33.46	7.21
L.S.D (5%)		**6.78**	**2.99**	**3.89**	**0.72**

Concerning the interaction effect of the tested commercial fertilizers and concentrations on the inflorescence diameter of cineraria, data in Table (6) concluded that the highest rate of fertilizer (3g/L) combined with Super - Feed fertilizer increased the inflorescence diameter, compared with other

fertilizers. The increase in the inflorescence diameter by this treatment amounted as 137.5% and 61.67% compared with control, in the first and second seasons, respectively, indicating that fertilization encourage the flowering growth of cineraria.

The interaction between the commercial fertilizers and concentration, presented in Table (6), demonstrate that Stimufol fertilizer at 3g/ L gave the highest fresh and dry weight of flowers. The fresh and dry weights for the interaction were (47.43 gm and 9.69 gm), and (49.65 gm and 10.18 gm), compared with (13.04 gm and 2.29 gm) and (17.24 gm and 3.29 gm) for control plants, in both seasons, respectively.

3-Effect of several commercial fertilizers on the chemical composition of cineraria (*Senecio cruentus* L) leaves:

The result presented in Table (7) indicated that all commercial fertilizers exmined in this study increased the chlorophyll a and b content in the fresh leaves, N, P and K, in the dry leaves, of cineraria as compared with their control in both seasons. However the increase in the N%, P% and K% reached the maximum values with Kristalon at 3.0 g/L. whereas, the chlorophyll a and b content in the leaves was higher as a result of using Super-Feed fertilizer at 3.0 g/L, in both seasons. In general, the most effective commercial fertilizer was Kristalon followed by Super-Feed and the Stimufol in this respect.

Table (7) Effect of concentration of some commercial fertilizers on the chemical composition of *Senecio cruentus* L, during the two successive seasons of 2005 & 2006.

Treatment		Chlorophyll mg/L		Nitrogen %	Phosphorus %	Potassium %
		(a)	(b)			
First season 2005						
Fertilizers	**Con. g/L**					
	0	3.86	1.56	1.69	0.27	1.26
Super- Feed	1	6.23	3.00	2.15	0.32	2.47
	2	8.57	4.39	2.46	0.41	2.90
	3	9.41	5.59	2.57	0.52	3.01
Stimufol	1	6.00	2.87	2.33	0.34	2.54
	2	7.02	3.51	2.45	0.42	2.83
	3	8.20	4.15	2.53	0.49	2.91
Kristalon	1	6.06	2.18	2.37	0.45	2.55
	2	6.98	2.48	2.63	0.56	2.97
	3	7.47	3.33	2.87	0.60	3.14
Second seasons 2006						
	0	3.95	1.49	1.89	0.25	1.13
Super- Feed	1	6.66	3.17	2.04	0.37	2.46
	2	8.25	3.52	2.46	0.43	2.69
	3	9.04	5.47	2.59	0.53	2.98
Stimufol	1	6.19	2.59	2.21	0.37	2.36
	2	7.30	3.24	2.40	0.44	2.68
	3	8.08	4.10	2.50	0.51	2.88
Kristalon	1	5.98	2.11	2.41	0.53	2.70
	2	6.81	2.52	2.72	0.58	2.89
	3	7.61	3.28	2.98	0.66	3.08

From the above results, it could be concluded that the all commercial fertilizers treatments markedly increased the growth parameters and chemical composition of cineraria leaves especially when the highest levels of these fertilizers were applied.

It could be recommended that the application of Kristalon fertilizers at 3.0 g/l every 2 weeks for cineraria is important to increase the quality and appearance of cineraria.

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تأثير بعض مستويات من الأسمدة التجارية على النمو الخضرى والزهرى والتركيب الكيماوى لنباتات السنانير

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أجريت هذه الدراسة بمزرعة كلية الزراعة جامعة قناة السويس خلال موسمى 2005 و 2006 لدراسة تأثير بعض مستويات من الأسمدة التجارية مثل سماد السوبر فيد (19: 19 : 19) والكريستالون (19: 19 : 19) و ستيمافول (25 : 16 : 12) نتروجين : فوسفور : بوتاسيوم بتركيزات : صفر : 1 : 2 :3 جرام / لتر من كل سماد على النمو الخضرى والزهرى والمحتوى الكيماوى لنباتات السنانير النامية فى أصص . تم تسميد النباتات مرة كل أسبوعين بالسماد المذاب فى الماء بمعدل 500 مل / أصيص خلال فترة الدراسة.

كانت أهم النتائج المتحصل عليها كالأتي :

- أدى إضافة سماد الكريستالون بمعدل 3 جم / لتر الى زيادة معنوية فى الصفات الخضرية للنبات ممثلة فى طول النبات وعدد الأوراق وطول الجذر والوزن الطازج للأفرع والأوراق. بينما أدى إضافة سماد السوبر فيد معدل 3 جم / لتر الى زيادة فى الصفات الزهرية مثل عدد الأزهار وقطر النورة وأيضا زيادة فى الوزن الطازج والجاف للجذور. كما أدى إضافة سماد ستيمفول بنفس المعدل الى زيادة عدد الأفرع وكذلك الوزن الطازج والجاف للأزهار.
- أدت معاملات التسميد الى زيادة محتوى الأوراق من النتروجين والفوسفور والبوتاسيوم نتيجة إضافة الأسمدة المذكورة تحت الدراسة وكانت هذه الزيادة واضحة مع استخدام سماد الكريستالون بمعدل 3 جم / لتر. بينما أدى استخدام سماد السوبر فيد بمعدل 3جم / لتر الى زيادة محتوى الأوراق من كلوروفيل أ و ب.
- من النتائج السابقة يتضح انه يمكن التوصية باستخدام سماد الكريستالون بمعدل 3 جم / لتر مرة كل أسبوعين للحصول على نباتات سنانير عالية الجودة.

Table (3) Effect of interaction of fertilizers and concentrations on vegetative growth of cineraria, during the two successive seasons of 2005 and 2006.

Fertilizer	Concentration g/L	Plant height (cm)	Shoots number /plant	Leaves number / plant	Root length (cm)	Fresh weight of Shoots (gm)	Dry weight of Shoots (gm)	Fresh weight of leaves (gm)	Dry weight of leaves (gm)	Fresh weight of roots (gm)	Dry weight of roots (gm)
First season (2005)											
Super-Feed	0	18.00	4.00	9.00	10.00	8.91	1.88	24.94	3.41	9.80	2.90
	1	23.50	5.50	22.75	14.25	17.39	3.73	35.42	4.48	15.27	4.67
	2	26.75	7.75	28.25	19.75	23.75	5.84	58.01	7.49	22.16	7.67
	3	28.50	9.50	34.50	23.50	37.09	9.09	61.55	7.72	31.80	9.94
Stimufol	0	19.00	3.00	10.00	13.00	11.89	2.39	26.92	3.09	11.16	2.63
	1	23.50	5.25	19.50	15.25	18.89	4.32	52.38	6.99	18.52	4.96
	2	26.75	7.25	25.50	20.25	24.06	5.71	56.41	7.43	25.43	6.78
	3	28.25	10.75	33.00	22.25	27.47	6.40	73.27	9.21	27.87	7.31
Kristalon	0	19.00	3.50	9.00	11.50	10.29	2.28	25.17	3.26	8.60	2.31
	1	24.25	6.00	20.25	16.00	19.96	4.24	47.14	6.87	19.77	5.92
	2	28.50	7.25	27.25	21.75	28.14	6.13	71.36	10.40	25.91	7.36
	3	33.00	8.50	37.50	27.25	40.51	8.02	93.36	13.59	29.04	8.36
L.S.D (5%)		**3.21**	**1.79**	**4.87**	**2.56**	**4.76**	**1.24**	**6.42**	**0.85**	**3.17**	**0.91**
Second season (2006)											
Super-Feed	0	20.00	3.00	10.00	11.00	9.11	1.71	33.35	3.38	11.76	2.91
	1	24.00	5.75	22.00	14.63	17.06	3.67	36.75	4.65	15.71	4.90
	2	27.00	8.00	29.50	19.75	24.65	6.06	57.20	7.45	22.87	7.99
	3	30.00	9.75	32.25	24.50	37.69	9.17	63.03	7.92	34.19	10.94
Stimufol	0	20.00	5.00	10.00	9.00	11.05	2.31	35.95	3.68	9.51	2.16
	1	23.75	5.00	19.00	16.00	19.35	4.52	51.30	6.84	19.30	5.17
	2	26.25	7.75	24.75	21.00	25.19	5.99	57.56	7.58	24.40	6.53
	3	28.00	9.75	32.50	22.00	28.17	6.73	74.90	9.38	28.36	7.45
Kristalon	0	21.00	5.50	12.50	10.50	14.36	2.79	33.83	3.45	8.49	2.01
	1	24.50	6.25	19.75	16.25	20.09	4.32	46.25	6.72	20.02	5.98
	2	28.25	7.00	27.00	22.25	27.25	5.43	70.93	10.32	26.24	7.59
	3	32.50	8.25	38.75	27.50	41.89	8.41	92.90	13.53	30.36	8.69
L.S.D (5%)		**3.18**	**1.65**	**4.13**	**2.36**	**5.08**	**1.35**	**5.21**	**0.72**	**3.57**	**1.06**

Table (1) Effect of some commercial fertilizers on the vegetative growth characters of cineraria (*Senecio cruentus* L), during the two successive seasons of 2005 and 2006

Fertilizer	Plant height (cm)	Shoot number /plant	Leaves number / plant	Root length (cm)	Fresh weight of Shoot (gm)	Dry weight of Shoot (gm)	Fresh weight of leaves (gm)	Dry weight of leaves (gm)	Fresh weight of roots (gm)	Dry weight of roots (gm)
First season (2005)										
Super-Feed	24.19	6.31	23.50	16.88	21.78	5.14	44.98	5.78	19.76	5.99
Stimufol	24.38	6.56	22.00	17.69	20.58	4.70	52.24	6.68	20.75	5.42
Kristalon	26.19	6.69	23.63	19.13	24.72	5.17	59.26	8.53	20.83	6.30
L.S.D (5%)	**1.61**	**NS**	**NS**	**1.28**	**2.38**	**NS**	**3.21**	**0.43**	**NS**	**0.46**
Second season (2006)										
Super-Feed	25.25	6.63	24.19	17.47	22.13	5.14	47.58	5.85	21.13	6.06
Stimufol	24.50	6.88	21.56	17.00	20.94	4.89	54.93	6.87	20.39	5.33
Kristalon	26.56	6.75	24.50	19.13	25.90	5.24	60.97	8.51	21.28	6.69
L.S.D (5%)	**1.59**	**NS**	**2.07**	**1.18**	**2.54**	**NS**	**2.60**	**0.36**	**NS**	**0.53**

Table (2) Effect of concentration of some commercial fertilizers on the vegetative growth characters of cineraria (*Senecio cruentus* L, during the two successive seasons of 2005 & 2006.

Concentration g/L	Plant height (cm)	Shoot number /plant	Leaves number / plant	Root length (cm)	Fresh weight of Shoot (gm)	Dry weight of Shoot (gm)	Fresh weight of leaves (gm)	Dry weight of leaves (gm)	Fresh weight of roots (gm)	Dry weight of roots (gm)
First season (2005)										
0	18.67	3.50	9.33	11.50	10.36	2.18	25.68	3.25	9.85	2.61
1	23.75	5.58	20.83	15.17	18.75	4.10	44.98	6.11	17.85	5.18
2	27.33	7.42	27.00	20.58	25.32	5.89	61.93	8.44	24.50	7.27
3	29.91	9.58	35.00	24.33	35.02	7.83	76.06	10.17	29.57	8.54
L.S.D (5%)	**1.86**	**1.03**	**2.82**	**1.48**	**2.75**	**0.71**	**3.71**	**0.49**	**1.83**	**0.53**
Second season (2006)										
0	20.33	4.50	10.83	10.17	11.51	2.27	34.38	3.50	9.92	2.36
1	24.08	5.67	20.25	15.63	18.84	4.17	44.77	6.07	18.34	5.35
2	27.17	7.58	27.08	21.00	25.70	5.83	61.89	8.45	24.50	7.37
3	30.17	9.25	35.50	24.67	35.92	8.10	76.94	10.27	30.97	9.02
L.S.D (5%)	**1.83**	**0.96**	**2.39**	**1.36**	**2.93**	**0.78**	**3.01**	**0.42**	**2.06**	**0.61**