

Influence of Compost Fertilization and Pinching Number on Growth and Flowering of Cineraria Plant

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Citation: Abdou, M.A.H, Fouad, A.H.A and Hassan, A.A. (2023). Influence of Compost Fertilization and Pinching Number on Growth and Flowering of Cineraria Plant. Scientific Journal of Agricultural Sciences, 5 (2): 17-30. <https://doi.org/10.21608/SJAS.2023.212815.1309>.

Publisher :
Beni-Suef University, Faculty of Agriculture

Received: 23 / 5 / 2023

Accepted: 27 / 5 / 2023

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ABSTRACT

The present work was undertaken at the Nursery of Floriculture Plants, Faculty of Agriculture, Minia University, through the two growing seasons of 2021/2022 and 2022/2023, to evaluate the impact of compost fertilization levels (0, 50, 75 and 100 g/pot) and pinching treatments (no pinching, pinched once, - twice and - thrice), moreover, their interaction on vegetative growth, flowering parameters and some chemical composition of *Cineraria hybrida* plant.

All compost levels significantly enhanced vegetative growth traits (plant height, stem diameter, number of branches and leaves/plant, leaf area and plant aerial parts dry weights), flowering traits (days taken to first flowering, number of flowers/plant, diameter and area of floral disc, flowering fresh weight and flowering duration) and chemical constituents [photosynthetic pigments (mg/g) and NPK (%)] comparing with control. In all cases, 100 g/pot compost was more effective in this concern.

Pinching treatments significantly decreased plant height, in the same time, significantly increased the other abovementioned characters. In most cases, the treatment of pinching plants twice was the best treatment in this concern.

The best interaction treatment was supplying plants with 100 g/pot compost plus pinched plants twice for good appearance of cineraria plant.

KEYWORDS: compost, pinching, cineraria

1. INTRODUCTION

Cineraria hybrida is a perennial plant belongs to Asteraceae family that abundantly uses as a pot flowering plant at Birth Day celebration in many countries, including Egypt, where, this plant is the main flowering pot plant in Spring Celebration Fair (Ghasemi and Kafi, 2005). Cineraria is a valuable flowering potted plant grown in cool climates and producing large massed heads of pink, white, purple, red, deep and light blue daisy like flowers. Meanwhile, there are some cultivars containing rings of other shades embedded in the blooms (El-Hindi *et al.*, 2006).

Compost is prepared by biological degradation of plant and animal residues under controlled, aerobic conditions (Eghball *et al.*, 1997). Compost is a save component which improve growth and flowering productivity of plants as well as reduce environmental pollution El-Hindi *et al.*, 2006 and Ghehsareh *et al.*, 2011 on cineraria; Abdou, 2003; Nair and Bharathi 2015 and Kala *et al.*, 2020 on chrysanthemum;; Riaz *et al.*, 2008; Sardoei *et al.*, 2014 and Bi *et al.*, 2021 on zinnia plant.

Pinching is the act of manual cutting or nipping off the new growth on a plant in order to force branching and shoots so that the

eventual number of flowers is increased, but decreased plant height. It makes compact, bushy plants, with more blooms. The stem diameter and number of inflorescences increase in the number of pruning's, while, plant height was decreased Ahmad *et al.*, 2007, on carnation plant; Habiba *et al.*, 2012; Thakare *et al.*, 2020; Hawa *et al.*, 2021 and Nagdeve *et al.*, 2021 on chrysanthemum; Khobragade *et al.*, 2012; Sailaja *et al.*, 2013; Gaidhani *et al.*, 2020b on aster plant; Sasikumar *et al.*, 2015; Singh, 2015; Khan *et al.*, 2018 and Rajput *et al.*, 2020 on (*Tagetes erecta*, L.); Ibrahim, 2017 on marigold (*Calendula officinalis*, L.); Sharaf-Eldien *et al.*, 2017 on *Zinnia elegans* and Yaseen *et al.*, 2021 on globe amaranth (*Gomphrena globosa* L.).

Therefore, this work aimed to study the response of *Cineraria hybrida* to compost and number of pinching as well as their interactions on growth parameters, flowering traits and some chemical constituents.

2. MATERIALS AND METHODS

The present study was under taken at the Nursery of Ornamental plants, Fac. Agric.,

Minia Univ. during the two seasons 2021/2022 and 2022/2023 to examine the effect of organic fertilization (compost) and number of pinching moreover interactions on vegetative growth parameters, flowering traits and some chemical composition of *Cineraria hybrida* plant.

Seedlings of cineraria averaged 3 cm in height and have 2 leaves were transplanted in 1st November of the two seasons 2021 and 2022 in plastic pots of 16-cm-width filled with 3.350 kg of sandy soil (one seedling/pot). The physical and chemical analyses of the used soil in the study are presented in Table (a).

The randomized complete block design in a split-plot design with three replicates was used. The main plots (A), included four levels of compost (0, 50, 75 and 100 g/pot), while, the sub-plots (B), involved four number of pinching (no pinching, pinched once, twice and thrice). Therefore, the study including 16 treatments (4 x 4). Each treatment included 8 pots (8 plants). The physical and chemical analyses were performed as described by ICARDA (2013).

Table a. The physical and chemical analyses of the used soil in the study during the two growing seasons (2021/2022 and 2022/2023).

Soil character	Values		Soil Character	Values	
	2021/2022	2022/2023		2021/2022	2022/2023
Physical properties:			DTPA-Extractable nutrients:		
Sand (%)	89.20	90.40	Total N (%)	0.02	0.02
Silt (%)	8.40	7.30	Available P (ppm)	3.45	2.53
Clay (%)	2.40	2.30	Extractable K (mg/100 g soil)	0.75	0.86
Soil type	Sandy	sandy	Fe (ppm)	1.01	1.08
Chemical properties:			Cu (ppm)	0.30	0.37
pH (1:2.5)	8.13	8.35	Zn (ppm)	0.31	0.28
E.C. (dS/m)	1.10	1.12	Mn (ppm)	0.49	0.60
O.M. (%)	0.02	0.03			
CaCO ₃ (%)	13.92	13.81			

Table b. The physical and chemical analyses of the used compost in the study during the two growing seasons (2021/2022 and 2022/2023).

Properties	Value	Properties	Value
Organic carbon (%)	25.1	Total P (%)	0.5
Humidity (%)	25	Total K (%)	1.0
Organic matter	44	Fe (ppm)	1750
C/N ratio	17.5	Zn (ppm)	60
pH (1:2.5)	8.0	Mn (ppm)	125
E.C. (m. mhos/cm.)	5	Cu (ppm)	200
Total N (%)	1.5		

The compost under trade name El-Nile compost was obtained from Egyptian company for solid waste utilization in New Minia City. The amounts of compost were added during the pots-filled in both seasons. Physical and chemical properties of the compost used are shown in Table (b).

The first pinching treatment had not removed the terminal bud (without pinching), the second treatment, terminal bud was removed at 1st December (pinching once), the third treatment, terminal buds were removed at 1st and 21st December (pinching twice), while, the last treatment terminal buds were removed at 1st and 21st December and 10th January (pinching thrice).

By the third week of April in both seasons, the experiment was ended and the following data were recorded vegetative growth parameter [plant height (cm), stem diameter (mm), number of branches/plant, number of leaves/plant, leaf area (cm²) and plant dry weight (g)].

Flowering traits [days to the first flowering, number of flowers/plant, diameter of the floral disc (cm), floral disc area (cm²), flowers fresh weight (g) and flowering duration (days)] and some chemical composition [photosynthesis colorings (chlorophyll a, b and carotenoids) and NPK%] were determined.

2.1. Laboratory analysis

2.2.2. Photosynthesis colorings determination:

The pigments contents were colorimetrically performed in the cineraria fresh leaves (mg/g f.w.) after three weeks of the last treatment during both seasons, following the method described by Fadl and Sari El-Deen (1978).

2.2.3. Nitrogen, phosphorus and potassium determination:

The nitrogen, phosphorus and potassium percentages in dry leaves were determined according to the methods described by ICARDA (2013).

2.3. Statistical analysis

The obtained results were tabulated and statistically analyzed according to MSTAT-C (1986), and LSD test at 0.05 was followed to compare between the treatments means.

3. RESULTS

3.1. Vegetative growth parameters

Data presented in Tables (1 and 2) showed that all levels used of compost led to significantly increase in all vegetative growth parameters [plant height (cm), stem diameter (mm), number of branches and leaves/plant, leaf area (cm²) and plant dry weight (g)] as compared to untreated plants (control) in both seasons. The highest values were obtained with 100 g/pot compost in both seasons.

The improvement role of compost was emphasized by Abdel-Kafie (2002), El-Hindi *et al.* (2006) and Ghehsareh *et al.* (2011) on cineraria, Abdou (2003), Singh *et al.* (2015), Situmeang *et al.* (2017), Sinha and Saravanan (2019), Kala *et al.* (2020), Monika and Chandla (2021), Sahu *et al.* (2022) and Singh *et al.* (2023) on chrysanthemum plant, Riaz *et al.* (2008), Sardoei *et al.* (2014), Bi *et al.* (2021) on zinnia plant, Sangwan *et al.* (2010), Tabrizi *et al.* (2011), Sardoei (2014), Abedini *et al.* (2015), Heydari *et al.* (2017) and Abd El-Fatah *et al.* (2019) on marigold plant, Ahmad *et al.* (2012) and Arunesh *et al.* (2020) on gerbera plant, Dubey *et al.* (2013) on *Petunia hybrida* plant and Abdou *et al.* (2019) on iris (*Iris tingitana* L.) plant.

As for pinching treatments, data listed in Tables (1 and 2) pointed out that all pinching number significantly decreased plant height and increasing other abovementioned characters comparing to control (no pinching) in both seasons. In most cases, pinched twice was more effective in this concern.

Pinching or cutting plants produced good appearance of vegetative growth parameters, except, plant height, these results are close to those obtained by Aflatuni *et al.* (2006) on mint, Ahmad *et al.* (2007) on carnation plant, Dorajeero and Mokashi (2012), Ona *et al.* (2015), Ahmade (2019), Thakare *et al.* (2020) and Nagdeve *et al.* (2021) on chrysanthemum plant, Khobragade *et al.* (2012), Sailaja *et al.* (2013) and Wani *et al.* (2018), Chopde *et al.* (2019) and Gaidhani *et al.* (2020b) on aster plant, Kumar *et al.* (2014) on stevia plant, Rajyalakshmi and Rajasekhar (2014), Sasikumar *et al.* (2015), Poudel *et al.* (2017), Khan *et al.* (2018), Singh *et al.* (2018) and

Table 1. Effect of compost fertilization, pinching number and their interactions on plant height (cm), stem diameter (mm) and branches number/plant of *Cineraria hybrid* in the two growing seasons (2021/2022 and 2022/2023).

Pinching number treatments	Compost levels treatments (g/pot) (A)											
	0.0	50	75	100	Mean (B)	0.0	50	75	100	Mean (B)		
	The 1 st season (2021/2022)					The 2 nd season (2022/2023)						
Plant height (cm)												
Control (no pinched)	28.0	30.8	33.9	37.3	32.5	27.9	30.7	33.9	37.1	32.4		
Pinched once	22.5	27.5	30.3	30.4	27.7	25.8	28.4	31.2	34.4	30.0		
Pinched twice	18.0	19.8	21.8	21.9	20.4	23.2	25.5	28.1	30.9	26.9		
Pinched thrice	17.0	18.7	20.6	20.8	19.3	20.9	23.0	25.3	27.8	24.3		
Mean (A)	21.4	24.2	26.7	27.6		24.5	26.9	29.6	32.6			
L.S.D. at 5 %	A: 1.2		B: 0.8		AB: 1.6		A: 2.3		B: 0.6		AB: 1.2	
Stem diameter (mm)												
Control (no pinched)	7.10	7.24	7.39	7.54	7.32	8.00	8.16	8.32	8.49	8.24		
Pinched once	7.81	7.96	8.13	8.29	8.05	8.80	8.98	9.16	9.34	9.07		
Pinched twice	8.59	8.76	8.94	9.12	8.85	9.68	9.87	10.07	10.27	9.97		
Pinched thrice	9.45	9.64	9.83	10.03	9.74	10.65	10.86	11.08	11.30	10.97		
Mean (A)	8.24	8.40	8.57	8.75		9.28	9.47	9.66	9.85			
L.S.D. at 5 %	A: 0.15		B: 0.11		AB: 0.22		A: 0.17		B: 0.12		AB: 0.24	
Branches number/plant												
Control (no pinched)	5.0	6.1	7.3	8.1	6.6	5.5	6.6	7.9	8.7	7.2		
Pinched once	6.1	6.8	8.2	9.0	7.5	6.7	8.1	9.7	10.6	8.8		
Pinched twice	6.5	7.8	9.4	10.2	8.5	7.2	8.6	10.3	11.4	9.4		
Pinched thrice	5.3	6.4	7.7	8.5	7.0	5.9	7.0	8.4	9.2	7.6		
Mean (A)	5.7	6.8	8.2	9.0		6.3	7.6	9.1	10.0			
L.S.D. at 5 %	A: 0.6		B: 0.4		AB: 0.8		A: 0.8		B: 0.4		AB: 0.8	

Rajput et al. (2020) on marigold (*Tagetes erecta*, L.) plant.

The interaction between compost levels and pinching number treatments was significant for vegetative growth parameters in both seasons. The highest values for cineraria height were compost at 100 g/pot plus no pinching, in both seasons. While, the best interaction treatment for compacting plant was at 100 g/pot plus pinching thrice, followed by pinching twice in both seasons. Also, the best interaction for the other vegetative growth was 100 g/pot plus pinching twice in both seasons

3.2. Flowering traits

Findings listed in Tables (3 and 4) observed that flowering traits [days taken to first flowering, number of flowers/plant, diameter and area of floral disc and flowering duration and

flower fresh weight/plant] were significantly increase by all used levels of compost facing the control treatment in both seasons. Ascending increased in all flowering characters with increasing compost dose. So the greatest values for all above-mentioned characters were obtained from the highest compost level (100 g/pot).

The enhancement role of organic fertilizer on flowering traits was emphasized by Abdel-Kafie (2002), El-Hindi *et al.* (2006) and Ghehsareh *et al.* (2011) on cineraria; Ikram *et al.* (2012) on tuberose (*Polianthes tuberosa* Linn) plant; Sardoei *et al.* (2014) on zinnia plant; Abdou and Ibrahim (2015) and Abdou *et al.* (2018a) on gladiolus plant; Nair and Bharathi (2015), Singh *et al.* (2015), Chauhan *et al.* (2022), Sahu *et al.* (2022) and Singh *et al.* (2023) on chrysanthemum plant; Abdou *et al.* (2019) on

Table 2. Effect of compost fertilization, pinching number and their interactions on number of leaves/plant, leaf area (cm²) and plant aerial parts dry weight (g) of *Cineraria hybrid* in the two growing seasons (2021/2022 and 2022/2023).

Pinching number treatments	Compost levels treatments (g/pot) (A)																								
	0.0					50					75					100					Mean (B)				
	The 1 st season (2021/2022)					The 2 nd season (2022/2023)																			
Number of leaves/plant																									
Control (no pinched)	12.9	13.5	14.2	14.9	13.9	13.1	13.8	14.4	15.2	14.1															
Pinched once	14.6	15.3	16.0	16.4	15.6	14.0	14.7	15.4	15.6	14.9															
Pinched twice	18.7	19.6	20.6	20.9	19.9	14.9	15.7	16.4	16.9	16.0															
Pinched thrice	13.0	13.6	14.3	14.6	13.8	13.8	14.3	15.2	15.7	14.8															
Mean (A)	14.8	15.5	16.3	16.7		14.0	14.6	15.4	15.9																
L.S.D. at 5 %	A: 0.4		B: 0.4		AB: 0.8		A: 0.6		B: 0.2		AB: 0.4														
Leaf area (cm²)																									
Control (no pinched)	57.38	60.82	64.47	67.70	62.59	8.00	8.16	8.32	8.49	8.24															
Pinched once	69.88	74.07	78.52	82.44	76.23	60.25	65.88	67.70	70.81	66.16															
Pinched twice	81.61	86.51	91.70	94.23	88.51	73.75	78.18	82.87	84.52	79.83															
Pinched thrice	67.52	71.57	75.87	77.96	73.23	85.64	90.85	96.48	97.66	92.66															
Mean (A)	54.75	73.24	77.64	80.58		70.91	75.26	79.68	80.47	76.58															
L.S.D. at 5 %	A: 2.92		B: 1.20		AB: 2.40		A: 1.68		B: 0.58		AB: 1.16														
Plant aerial parts dry weight (g)																									
Control (no pinched)	5.76	7.15	8.58	10.29	7.95	6.49	7.78	9.34	11.20	8.70															
Pinched once	7.79	9.33	11.20	13.44	10.44	8.04	9.62	11.54	13.85	10.76															
Pinched twice	10.90	13.08	15.70	18.85	14.63	11.28	13.54	16.24	19.45	15.13															
Pinched thrice	10.62	12.74	15.29	18.35	14.25	10.91	13.08	15.70	18.84	14.63															
Mean (A)	8.77	10.58	12.69	15.23		9.18	11.01	13.21	15.84																
L.S.D. at 5 %	A: 1.61		B: 0.52		AB: 1.04		A: 1.73		B: 0.54		AB: 1.08														

iris (*Iris tingitana* L.) plant; Abd El-Fatah et al. (2019), on pot marigold (*Calendula officinalis* L.) and Arunesh et al. (2020) on gerbera plant.

Regarding the impact of pinching treatments, data presented in Tables (3 and 4) showed that all abovementioned parameters of flowering were significantly increased due to all treatments of pinching (once, twice and thrice) comparing to control (no pinching) in both seasons. It could be noticed that in most cases, the treatment of pinching twice was more suitable in this concern.

Similar results were obtained by Ahmad et al. (2007), on carnation plant; Khobragade et al. (2012) and Gaidhani et al. (2020a) on aster plant; Sasikumar et al. (2015), Singh et al. (2017) and Singh et al. (2019) on marigold

(*Tagetes erecta*, L.) plant and Ahmade (2019), Thakare et al. (2020), Ehsanullah et al. (2021) on chrysanthemum plant.

The interaction effect between compost and pinching treatments was significant for days taken to first flowering, number of flowers/plant, diameter and area of floral disc and flowering duration and flower fresh weight/plant. The shortest period needed to flowering was found with the plants no pinched x no fertilized, while, the longest period needed to flowering was recorded with 100 g/pot compost plus pinched thrice. Moreover, the best interaction treatment for other flowering traits were obtained from plants received 100 g/pot compost plus pinched twice in both seasons.

Table 3. Effect of compost fertilization, pinching number and their interactions on days taken to the first flowering, number of flowers/plant and diameter (cm) of the floral disc of *Cineraria hybrid* in the two growing seasons (2021/2022 and 2022/2023).

Pinching number treatments	Compost levels treatments (g/pot) (A)										
	0.0	50	75	100	Mean (B)	0.0	50	75	100	Mean (B)	
	The 1 st season (2021/2022)					The 2 nd season (2022/2023)					
Days to the first flowering											
Control (no pinched)	127.8	129.1	130.4	133.0	130.1	128.1	129.4	130.7	133.3	130.4	
Pinched once	131.6	132.9	134.3	137.0	134.0	132.0	133.7	134.6	137.3	134.3	
Pinched twice	133.0	134.5	135.9	139.0	135.6	134.6	136.0	137.4	140.1	137.0	
Pinched thrice	135.6	137.1	138.4	141.2	138.1	137.2	138.6	140.0	142.9	139.7	
Mean (A)	132.0	133.4	134.8	137.6		133.0	134.3	135.7	138.4		
L.S.D. at 5 %	A: 1.4		B: 0.9		AB: 1.8		A: 1.3		B: 0.6		AB: 1.2
Number of flowers/plant											
Control (no pinched)	22.0	32.5	47.0	57.8	39.8	24.2	35.0	49.8	60.5	42.4	
Pinched once	37.0	46.0	66.8	80.2	57.5	40.6	58.8	84.4	101.2	71.3	
Pinched twice	41.8	60.0	87.3	102.6	72.9	46.8	66.7	95.3	116.9	81.4	
Pinched thrice	27.7	40.5	58.5	71.5	49.6	30.2	44.1	63.4	76.4	53.5	
Mean (A)	32.1	44.7	64.9	78.0		35.4	51.1	73.2	88.7		
L.S.D. at 5 %	A: 3.8		B: 1.6		AB: 3.2		A: 5.2		B: 1.9		AB: 3.8
Diameter of the floral disc (cm)											
Control (no pinched)	6.0	8.9	12.8	15.8	10.9	7.0	10.2	14.4	17.5	12.3	
Pinched once	10.4	13.0	18.9	22.7	16.2	12.2	17.6	25.3	30.4	21.4	
Pinched twice	11.9	17.0	24.8	29.1	20.7	14.5	20.7	29.5	36.2	25.2	
Pinched thrice	7.9	11.6	16.7	20.4	14.1	9.4	13.7	19.7	23.8	16.6	
Mean (A)	9.1	12.6	18.3	22.0		10.8	15.5	22.3	27.0		
L.S.D. at 5 %	A: 1.8		B: 1.4		AB: 2.8		A: 1.9		B: 1.6		AB: 3.2

3.3. Chemical constituents

3.3.1. Photosynthetic pigments (mg/g f.w.)

Data presented in Table (5) revealed that all used levels of compost significantly enhanced chlorophyll a, b and carotenoids in the fresh leaves of cineraria in both seasons facing the control treatment. The high contents of photosynthetic pigments (mg/g f.w.) were obtained from plants received 100 g/pot compost.

Similarly, Abdel-Kafie (2002) and El-Hindi *et al.* (2006) on cineraria; Abdou (2003) and Abdullah *et al.* (2021) on chrysanthemum plant; Sardoei *et al.* (2014) on pot marigold (*Calendula officinalis* L.); Abdou *et al.* (2018 b) on gladiolus plant and Bi *et al.* (2021) on zinnia plant.

Concerning the effect of pinching treatments, data in Table (5) showed that pinching plants led to significant increase in photosynthetic pigments (chlorophyll a, b and carotenoids) facing the control in both seasons, with superiority for the treatment of pinched twice in this concern.

In accordance with our results, those clarified by Ona *et al.* (2015) and Ahmade (2019) on chrysanthemum plants; Ibrahim (2017) on marigold (*Calendula officinalis*, L.); Sharaf-Eldien *et al.* (2017) on *Zinnia elegans* and Wani *et al.* (2018) on aster plant.

The interaction between the main and sub-plots treatments (A x B) was significant for chlorophyll a, b and carotenoids in both seasons. The highest values were produced from plants received 100 g/pot compost and pinched twice, in both seasons.

Table 4. Effect of compost fertilization, pinching number and their interactions on floral disc area (cm²), flowers fresh weight (g) and flowering duration (days) of *Cineraria hybrid* in the two growing seasons (2021/2022 and 2022/2023).

Pinching number treatments	Compost levels treatments (g/pot) (A)																								
	0.0					50					75					100					Mean				
	The 1 st season (2021/2022)					The 2 nd season (2022/2023)																			
	Floral disc area (cm²)																								
Control (no pinched)	9.4	14.0	20.1	24.8	17.1	11.0	16.0	22.6	27.5	19.3															
Pinched once	16.3	20.4	29.7	35.7	25.5	19.2	27.7	39.8	47.8	33.6															
Pinched twice	18.7	26.7	39.0	45.7	32.5	22.8	32.5	46.4	56.9	39.6															
Pinched thrice	12.4	18.2	26.2	32.1	22.2	14.8	21.5	31.0	37.4	26.2															
Mean (A)	14.2	19.8	28.8	34.6		16.9	24.4	34.9	42.4																
L.S.D. at 5 %	A: 3.9		B: 1.6		AB: 3.2		A: 4.2		B: 2.1		AB: 4.2														
	Flowers fresh weight (g)																								
Control (no pinched)	7.31	8.76	10.51	17.61	11.05	7.60	9.13	10.96	13.13	10.21															
Pinched once	9.49	11.39	13.66	16.40	12.74	9.88	12.84	15.41	18.50	14.16															
Pinched twice	13.29	15.94	19.13	22.96	17.83	13.85	16.62	19.94	23.93	18.59															
Pinched thrice	13.10	15.72	18.86	22.53	17.55	13.16	15.79	18.95	22.75	17.66															
Mean (A)	10.80	12.95	15.54	19.88		11.12	13.60	16.32	19.58																
L.S.D. at 5 %	A: 1.15		B: 0.21		AB: 0.42		A: 1.48		B: 0.33		AB: 0.66														
	Flowering duration (days)																								
Control (no pinched)	38.48	39.28	39.44	40.16	39.3	37.2	38.32	39.52	40.8	39.0															
Pinched once	39.68	40.08	41.44	40.72	40.5	39.6	40.4	41.28	42	40.8															
Pinched twice	40.56	41.28	41.52	42.08	41.4	40.48	41.2	42.08	42.96	41.7															
Pinched thrice	41.76	42.48	43.2	43.68	42.8	41.36	42.24	42.96	43.84	42.6															
Mean (A)	40.1	40.8	41.4	41.7		39.7	40.5	41.5	42.4																
L.S.D. at 5 %	A: 0.8		B: 0.3		AB: 0.6		A: 0.7		B: 0.2		AB: 0.4														

3.3.2. N, P and K (%)

Findings listed in Table (6) proved that each compost level (50, 75 and 100 g/pot) significantly increased N, P and K% in the dry leaves of cineraria plant in both seasons comparing with the control treatment. The high percentages of N, P and K% were obtained from plants received 100 g/pot compost.

Similar results were obtained by Abdel-Kafie (2002) and El-Hindi *et al.* (2006) on cineraria; Abdou (2003) on chrysanthemum plant; Gholipour *et al.* (2014) and Abd El-Fatah *et al.* (2019) on pot marigold (*Calendula officinalis* L.) and Abdou *et al.* (2018b) on gladiolus plant.

Regarding the impact of pinching number, data presented in Table (6) showed that pinching

plants led to significant increase in mineral percentages (N, P and K%) facing the control in both seasons, with superiority for the treatment of pinched thrice than other two treatments.

In accordance with our results, were those clarified by Ibrahim (2017) on marigold, *Calendula officinalis*, L.; Sharaf-Eldien *et al.* (2017) on *Zinnia elegans* and Wani *et al.* (2018) on aster plants.

The interaction between compost and pinching number treatments was significant for NPK% in both seasons. The highest percentages were obtained with supplying plants with 100 g/pot compost and pinched thrice, followed by pinching twice in both seasons as clearly indicated in Table (6).

Table 5. Effect of compost fertilization, pinching number and their interactions on chlorophyll a, b and carotenoids content (mg/g f.w.) of *Cineraria hybrid* in the two growing seasons (2021/2022 and 2022/2023).

Pinching number treatments	Compost levels treatments (g/pot) (A)										
	0.0	50	75	100	Mean (B)	0.0	50	75	100	Mean (B)	
	The 1 st season (2021/2022)					The 2 nd season (2022/2023)					
Chlorophyll a content (mg/g f.w.)											
Control (no pinched)	1.975	2.791	2.985	3.135	2.722	1.995	2.819	3.015	3.166	2.749	
Pinched once	2.827	3.101	3.317	3.483	3.182	2.855	3.132	3.350	3.518	3.214	
Pinched twice	3.136	3.445	3.686	3.87	3.534	3.167	3.479	3.723	3.909	3.570	
Pinched thrice	2.912	3.191	3.407	3.573	3.271	2.941	3.223	3.441	3.609	3.303	
Mean (A)	2.713	3.132	3.349	3.515		2.740	3.163	3.382	3.550		
L.S.D. at 5 %	A: 0.164		B: 0.091		AB: 0.182		A: 0.166		B: 0.095		AB: 0.190
Chlorophyll b content (mg/g f.w.)											
Control (no pinched)	0.819	0.903	0.973	1.021	0.929	0.831	0.917	0.988	1.036	0.943	
Pinched once	0.910	1.003	1.080	1.134	1.032	0.924	1.018	1.096	1.151	1.047	
Pinched twice	1.015	1.114	1.200	1.360	1.172	1.030	1.131	1.218	1.380	1.190	
Pinched thrice	0.940	1.033	1.11	1.164	1.062	0.954	1.048	1.127	1.181	1.078	
Mean (A)	0.921	1.013	1.091	1.170		0.935	1.028	1.107	1.187		
L.S.D. at 5 %	A: 0.091		B: 0.029		AB: 0.058		A: 0.093		B: 0.030		AB: 0.060
Carotenoids content (mg/g f.w.)											
Control (no pinched)	0.873	0.942	1.020	1.197	1.008	0.887	0.957	1.036	1.216	1.024	
Pinched once	0.970	1.047	1.133	1.188	1.085	0.986	1.064	1.151	1.207	1.102	
Pinched twice	1.060	1.164	1.259	1.320	1.201	1.077	1.183	1.279	1.341	1.220	
Pinched thrice	1.000	1.077	1.163	1.218	1.115	1.016	1.094	1.182	1.237	1.132	
Mean (A)	0.976	1.058	1.144	1.231		0.991	1.074	1.162	1.250		
L.S.D. at 5 %	A: 0.080		B: 0.030		AB: 0.060		A: 0.082		B: 0.030		AB: 0.060

4. Discussion

From our results, generally, all vegetative, flowering and some chemical parameters were enhancement as supplying cineraria plant grown in sandy soil with compost. It may be attributed to that compost led to increase the constituents and fraction of plant secondary metabolites, improved root dehydrogenase, ATP-ase and microorganism activities and nutrient uptake, sequence, improve growth, flower productivity (Lu *et al.*, 2002; Zheljaskov, 2005 and Griffin and Hutchinson, 2007).

Pinching plants led to decreased plant height, on the other hand, it increased number of branches (plant spread), stem diameter, number of leaves, and makes plant compact bushy plants, especially, thrice pinched plants.

Generally, pinching late flowering appearance and enhanced number of flowers, it may be due to pinching accumulates more photo synthates which are utilized for the production of more flowers. Pinching checked apical dominance and diverted extra energy in to the production of more number of branches and flowers (Pushkar and Singh, 2012 and Jena *et al.*, 2021).

5. Conclusion

To obtain good appearance of potted cineraria plant, it should be supplying plants with 100 g/pot compost (16-cm-diameter filled with 3.350 kg of sandy soil) and pinched plants twice (the pinching after one month of transplanting, 1st December, and repeated after 20 days).

Table 6. Effect of compost fertilization, pinching number and their interactions on nitrogen, phosphorus and potassium (%) of *Cineraria hybrid* in the two growing seasons (2021/2022 and 2022/2023).

Pinching number treatments	Compost levels treatments (g/pot) (A)										
	0.0	50	75	100	Mean (B)	0.0	50	75	100	Mean (B)	
	The 1 st season (2021/2022)					The 2 nd season (2022/2023)					
Nitrogen (%)											
Control (no pinched)	1.79	1.97	2.26	2.47	2.12	1.84	2.03	2.33	2.54	2.19	
Pinched once	1.88	2.07	2.34	2.55	2.21	1.97	2.17	2.46	2.68	2.32	
Pinched twice	2.02	2.22	2.53	2.76	2.38	2.10	2.31	2.63	2.87	2.48	
Pinched thrice	2.23	2.45	2.79	2.94	2.60	2.32	2.55	2.90	3.06	2.71	
Mean (A)	1.98	2.18	2.48	2.68		2.06	2.27	2.58	2.79		
L.S.D. at 5 %	A: 0.18		B: 0.08		AB: 0.16		A: 0.20		B: 0.10		AB: 0.20
Phosphorus (%)											
Control (no pinched)	0.24	0.28	0.32	0.38	0.31	0.25	0.30	0.35	0.40	0.33	
Pinched once	0.29	0.37	0.42	0.45	0.38	0.31	0.40	0.43	0.49	0.41	
Pinched twice	0.34	0.39	0.44	0.50	0.42	0.37	0.43	0.47	0.53	0.45	
Pinched thrice	0.44	0.50	0.56	0.59	0.52	0.46	0.54	0.57	0.61	0.55	
Mean (A)	0.33	0.39	0.44	0.48		0.35	0.42	0.46	0.51		
L.S.D. at 5 %	A: 0.06		B: 0.02		AB: 0.04		A: 0.05		B: 0.02		AB: 0.04
Potassium (%)											
Control (no pinched)	1.33	1.46	1.61	1.77	1.54	1.36	1.50	1.64	1.81	1.58	
Pinched once	1.40	1.54	1.68	1.84	1.62	1.44	1.59	1.74	1.90	1.67	
Pinched twice	1.51	1.76	1.95	2.16	1.85	1.57	1.83	2.03	2.24	1.92	
Pinched thrice	1.65	1.85	2.07	2.21	1.95	1.72	1.94	2.17	2.32	2.04	
Mean (A)	1.47	1.65	1.83	2.00		1.52	1.72	1.90	2.07		
L.S.D. at 5 %	A: 0.16		B: 0.03		AB: 0.06		A: 0.18		B: 0.04		AB: 0.08

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الملخص العربي

تأثير التسميد بالكمبوست وعدد مرات التطويش علي النمو والتزهير لنبات السنانير

محمود عبدالهادي حسن عبده، آمنة هادي عبدالعزيز فؤاد و أحمد علي حسن

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أجريت هذه التجارب في مشتل نباتات الزينة، قسم البساتين، كلية الزراعة، جامعة المنيا، خلال موسمي نمو متعاقبين ٢٠٢٢/٢٠٢١ و ٢٠٢٣/٢٠٢٢، لتقييم تأثير مستويات الكمبوست (صفر - ٥٠ - ٧٥ - ١٠٠ جم/أصيص) ومعاملات التطويش (بدون تطويش - تطويش مرة واحدة - تطويش مرتين - تطويش ثلاث مرات) والتداخل بينهما علي صفات النمو والتزهير وبعض المكونات الكيماوية لنبات السنانير. أظهرت جميع مستويات الكمبوست زيادة معنوية في صفات النمو الخضري (طول النبات - سُمك الساق - عدد الفروع/النبات - عدد الأوراق/النبات - مساحة الورقة - الوزن الجاف للأجزاء الهوائية للنبات) و صفات النمو الزهري (عدد الأيام اللازمة لبداية التزهير - عدد الأزهار/نبات - قطر ومساحة القرص الزهري - الوزن الطازج للأزهار - مدة التزهير) وبعض المكونات الكيماوية (صبغات البناء الضوئي - النسبة المئوية للنيتروجين والفوسفور والبوتاسيوم). وكانت المعاملة ١٠٠ جم/أصيص كمبوست هي الأكثر فعالية في هذا الشأن. أدت معاملات التطويش إلي نقص معنوي في طول النبات، وفي نفس الوقت، أدت إلي زيادة معنوية لباقي الصفات المدروسة. وفي معظم الحالات، كانت معاملة التطويش مرتين هي الأفضل في هذا الشأن. كانت أفضل معاملة تفاعل للحصول علي مظهر جيد لنبات السنانير هي إمداد النبات بـ ١٠٠ جم/أصيص كمبوست مع تطويش النباتات مرتين.