

EFFECT OF COMPLESAL FERTILIZER ON THE GROWTH AND FLOWERING  
CHARACTERS OF QUEEN ELIZABETH ROSE PLANTS.

Afify, M.M.; Mazrou, M.M. and Eraki, M.A.  
Faculty of Agriculture, Minufiya University, Shebin El-Kom,  
EGYPT.

تأثير الرش بالكومبيلسال على النمو وخواص أزهار الورد صنف "كوين اليزابيث"

محمد موسى عفيقى - متولى مسعد مزروع - محمد عبد الله عراقى  
كلية الزراعة - جامعة المنوفية

ملخص البحث

أجريت التجربة فى مزرعة كلية الزراعة بشبين الكوم فى موسم ١٩٨٧/٨٦ ،  
١٩٨٨/٨٧ لدراسة تأثير الرش بالسماد المركب "كومبيلسال" بتركيزات صفر ،  
٠.٣ ، ٠.٦ ، ٠.٩ ، على نمو وخواص الأزهار فى الورد صنف "كوين اليزابيث".  
وكانت أهم النتائج كالاتى :-

- ١ - أدى الرش بالكومبيلسال الى زيادة معنوية فى عدد الأزهار على النباتات  
عن الكنترول ، وكان ذلك واضحا بمعاملة الرش بتركيز ٠.٩ % .
- ٢ - أدت كل معاملات الرش بالكومبيلسال الى زيادة معنوية فى طول الزهرة  
ووزنها الطازج ، طول الساق الزهرية وسمكها ووزنها الطازج ، عدد  
الأوراق على الساق الزهرية ووزنها الطازج والجاف عن الكنترول ، وكانت  
أحسن النتائج عند الرش بتركيز ٠.٣ % و ٠.٦ % .
- ٣ - ازدادت النسب المثوية لكل من النيتروجين والفوسفور والبوتاسيوم والمغنسيوم  
والمحتوى من المنجنيز بالرش بالكومبيلسال وبخاصة عند تركيز ٠.٣ %  
و ٠.٦ % .
- ٤ - بصفة عامة ازداد محتوى الأوراق من الكربوهيدرات الكلية نتيجة للرش  
بالكومبيلسال .

## ABSTRACT

This investigation was carried out as an attempt to improve the productivity and flowering characters of old Queen Elizabeth rose bushes. Four concentrations of Complezal fertilizer (0.0%, 0.3%, 0.6% and 0.9%) were used for six times as foliar application in the two experimental seasons of 1986/1987 and 1987/1988.

The obtained results revealed that, the different concentrations of Complezal fertilizer significantly increased flower number per plant than the control. The best results in this respect were obtained by the highest concentration of Complezal (0.9%). All the treatments of Complezal increased significantly flower length and its fresh weight, flowering stem measurements, number of leaves per flowering stem, fresh and dry weight of the leaves than the untreated plants. Complezal concentrations at 0.3% and 0.6% gave the best results in this respect. Also, the highest content of N, P, K, Mg and Mn were obtained with Complezal fertilizer at the concentrations of 0.3% and 0.6%. Generally, the different Complezal treatments caused an increase in total carbohydrate content in the leaves than the control in the two seasons.

## INTRODUCTION

Rose is one of the most economical florist crops in Egypt and all over the world. Recently there is a remarkable attention for increasing the areas planted with roses and improving its production for local and export purposes.

It is well known that fertilization treatments is one of the most effective factors on cut flower quality and yield of roses. Fertilizer addition to the soil may be fixed and become unavailable for plants, also the added nutrients to the medium could be used by micro-organism or leached away by frequent watering (Paparozzi and Tukey, 1979). Therefore, foliar application of fertilizers could be used as an alternative method to conventional soil application method. Wittwar and Teubner (1959) reported that foliar nutrition

offers advantages of more rapid and efficient absorption as well as good utilization of nutrients as compared to nutrient applied to the root medium. Mousa (1979) mentioned that the foliar application of the commercial fertilizers (Folie-Fertile at 0.3%, Nutrin at 1%, Bayfolan at 0.2% and Urea at 0.3%) lead to an increase of flower production in Jolie Madame roses, but the best results were obtained from Bayfolan and Folie-Fertile followed by Nutrin. Koriesh (1984) found that using commercial fertilizers: Complezal, Folie-Fertile and Over-growth as foliar application caused a markedly improvement in both vegetative growth and flower characters of chrysanthemum plants. Shoushan et al. (1978) reported that spraying Hippeastrum vittatum plants by 0.5% Nutrin solution at fortnightly intervals caused an increase in stem length and its diameter, encouraged leaf formation, increased flower size and the fresh weight of cut spike. Nanjan and Muthuswamy (1974) showed that all the foliar nutrient treatments increased the flowering shoot length, number of shoots/plant and flowering yield of Edward roses.

From the above mentioned results it could be noticed that researches on adequate fertilization of rose plants are still needed. Therefore, the present investigation was under-taken on old rose plants to determine the suitable concentration from this commercial fertilizer "Complezal", which may guarantee the best growth and flowering characters of old rose plants (cv. Queen Elizabeth) under our environmental conditions.

#### MATERIALS AND METHODS

Two field experiments were carried out at the Farm of the Faculty of Agriculture at Shebin El-Kom on Queen Elizabeth rose plants of twelve years old during 1986/1987 and 1987/1988. Four rose plants at a distance of 60 cms apart in plot of 1.2 x 1.2 meters were used for each of three replicates in each treatment,

which distributed in a Randomized Complete Block design. Three main balanced branches were chosen on each plant and pruned to 40 cms. On October 10<sup>th</sup> of 1986 and 1987, respectively. The treatments were sprayed with 0, 0.3, 0.6 and 0.9% of Complisal as a commercial fertilizer which contains macro and micro elements (N 8%, P<sub>2</sub>O<sub>5</sub> 8%, K<sub>2</sub>O 6%, Mg 0.01%, Mn 0.01%, Zn 0.005%, Cu 0.01%, Fe 0.01%, S 0.16%, B 0.01% and Mo 0.005%) at six fortnightly intervals starting from 10<sup>th</sup> of November in both seasons.

The number of flowers and their measurements were recorded and statistically analyzed. The leaves were dried at 60°C for chemical analysis during November, December, January and February in both seasons.

Total nitrogen percentages were determined by using the micro-Kjeldahl methods as described by A.O.A.C. (1970).

Phosphorus percentages were determined according to Frie et al. (1964).

Potassium was determined by Flamephotometer.

Magnesium and Manganese were determined by Perkin-Elmer Atomic Absorption Spectrophotometer.

Total carbohydrates were determined according to Dubios et al. (1956).

## RESULTS AND DISCUSSION

### I. Number of flowers:

The data recorded in Table (1) show that different Complisal concentrations increased significantly number of flowers per plant in the two seasons than the control. The highest number of flowers

Table (1): Effect of complesal as foliar fertilization on flower properties and flowering stem measurements of Queen Elizabeth rose plants during the seasons of 1986/1987 and 1987/1988.

Complesal concent. %	No. of fl. per plant	Length of fl. in cms.	Fresh wt. of flower in gms.	Length of fl. stem in cms.	Diam. of fl. stem at top in mms.	Diam. of fl. stem at base in mms.	Fresh wt. of fl. stem in gms.	No. of leaves on fl. stem	Fresh wt. of leaves on fl. stem in gms.	Dry wt. of leaves on fl. stem in gms.
0.0	7.27	3.98	4.91	50.33	4.10	7.63	26.12	10.84	11.00	3.61
0.3	8.22	4.35	5.68	62.65	4.50	8.17	35.57	12.61	14.05	5.02
0.6	8.39	4.43	5.67	63.68	4.60	8.20	35.33	12.84	14.12	5.07
0.9	9.25	4.37	5.19	59.29	4.40	8.00	32.14	11.48	13.07	4.70
L.S.D. at 5%	0.51	0.28	0.33	6.28	0.18	0.42	3.60	1.66	2.42	0.83
L.S.D. at 1%	0.76	0.43	0.49	9.39	0.26	0.63	5.38	2.48	3.62	1.24
0.0	6.75	4.50	5.33	55.50	4.30	7.95	29.90	11.15	11.70	3.95
0.3	7.80	4.85	5.10	65.90	4.80	8.55	39.40	13.10	14.95	5.25
0.6	8.00	5.00	6.30	66.40	4.90	8.67	40.17	13.45	15.30	5.22
0.9	8.80	4.90	5.65	63.70	4.70	8.40	37.50	12.00	14.40	5.00
L.S.D. at 5%	0.42	0.32	0.53	4.33	0.35	0.45	4.38	1.55	2.49	0.79
L.S.D. at 1%	0.63	0.49	0.79	6.48	0.52	0.67	6.56	2.32	3.72	1.19

per plant was obtained by spraying rose plants with Complezal fertilizer at highest concentration (0.9%). Many investigators reported that the addition of fertilizers increased flowers production of roses, El-Gamassy and El-Shafie (1967,a), Bakly (1974), Nanjan and Muthuswamy (1974) and Mousa (1979). This increment may be due to the important role of nitrogen as a main element in this fertilizer, which is necessary for the synthesis of protein and cytokinin, which affect cell division and consequently branching stimulation, Wagner and Michael (1971).

## II. Flower length and its fresh weight:

The results in Table (1) indicate that the different concentrations of Complezal as foliar fertilization increased significantly both flower length and its fresh weight than the control, especially with the treatments of 0.3 and 0.6% in the two seasons. These results are in agreement with those obtained by El-Gamassy and El-Shafie (1967,a) and Bakly (1974) on roses, who reported that the N P K application improved flower quality. Also, Shoushan (1978) on Hippeastrum vittatum and Koriesh (1984) on chrysanthemum plants mentioned the same trend by using a complete commercial fertilizers. These results were probably attributed to the role of each element in the Complezal fertilizer, especially nitrogen, which is important for the formation of new cells.

## III. Length of fresh weight of flowering stem:

The data tabulated in Table (1) indicate that foliar application of Complezal at different concentrations significantly increased stem length and its fresh weight than the control. The best results in this respect were obtained by using Complezal at the concentrations of 0.3 and 0.6%. These results are in harmony with the findings of El-Gamassy and El-Shafie (1967,a), Mousa (1979), Nanjan and Muthuswamy (1974) and Bakly (1974) on rose plants. Also, Afify (1986)

on gladiolus, Shoushan et al. (1978) on amaryllus and Koriesh (1984) on chrysanthemum stated the same results. The increment in flower stem length and its fresh weight due to the Complestal application at different concentrations may be caused a large portion of the carbohydrates to be made in to protein and protoplasm for more meristemetic cells for the best growth and production of the plant.

#### VI. Diameter of flowering stem:

The results in Table (1) show that the different Complestal concentrations increased significantly the diameter of flowering stem than the control. The best results in this respect were obtained with the treatments of 0.3 and 0.6% Complestal. Similar results were reported by El-Gamassy and El-Shafie (1967,a) and Nijjar and Rebalia (1977) on roses. Also, Koriesh (1984) on chrysanthemum, Afify (1986) on gladiolus and Shoushan et al. (1978) on Hippeastrum vitaatum stated the same trend.

#### V. Number of leaves per flowering stem:

It is clear from the results in Table (1) that the treatments of 0.3 and 0.6% Complestal significantly increased leaf number per flowering stem than the control and the treatment of 0.9% Complestal in the two seasons. Similar results were obtained by Khattab et al. (1984) on Monstera diliciosa, Afify on gladiolus and Shoushan et al. (1978) on amaryllis. These results could be explained the physiological role of each element in Complestal fertilizer, especially N which is important for the formation of new cells.

#### IV. Fresh and dry weight of leaves:

It is evident from the results in Table (1) that the fresh and dry weight of leaves on the flowering stem were significantly increased by the different Complestal concentrations than the control. The treatment of Complestal at 0.9% caused a slight decrease in this

respect than the treatments of Complestal at 0.3 and 0.6%. This increment in the fresh and dry weight of leaves may be due to the increase in leaf number on the flowering stem as well as the increase in plant metabolism, which may be caused by using a complete foliar fertilizer "Complestal".

From the previous results, it could be concluded that commercial fertilizer "Complestal" at concentrations of 0.3 or 0.6% produced the highest flowering stem measurements, except the number of flowers which was hastened by the treatment of 0.9% Complestal.

#### Chemical analysis:

##### A) Mineral content:

The data in Table (2) show clearly that spraying Queen Elizabeth rose plants by the different concentration of the complete fertilizer "Complestal" caused an increase in N, P, K, Mg and Mn content in the leaves in the two experimental seasons, when compared with the control plants. This increment in mineral content was observed when the concentration of Complestal was increased and reached 0.6%. On the other hand the high concentration 0.9% of Complestal caused a slight decrease in this respect. The increment in mineral content in the leaves could be attributed to the high absorption rate of these elements, when the Complestal fertilizer was used at suitable concentrations. Similar results were obtained by El-Gamassy and El-Shafie (1967,a) on roses, Koriesh (1984) on chrysanthemum and Afify (1986) on gladiolus plants.

Generally, there were no clear differences in the mineral content of the leaves during the experimental months in the two seasons, Table (2).



Table (2): Effect of different concentrations of "Complexal" on the Mineral contents in the leaves of Queen Elizabeth rose plants during the seasons of 1986/1987 and 1987/1988.

Complexal content. %	Elements	1986/1987					1987/1988				
		Nov.	Dec.	Jan.	Feb.	Mean	Nov.	Dec.	Jan.	Feb.	Mean
0.0	N %	2.00	2.07	2.22	2.18	2.12	1.80	1.87	2.02	1.98	1.92
	P %	0.32	0.32	0.34	0.32	0.33	0.28	0.28	0.30	0.30	0.29
	K %	2.42	2.20	1.98	2.20	2.20	2.10	2.00	1.90	2.05	2.01
	Mg %	0.30	0.34	0.35	0.37	0.34	0.29	0.31	0.34	0.35	0.32
	Mn p.p.m.	168.00	135.00	220.00	177.00	175.00	160.00	140.00	190.00	180.00	163.00
0.3	N %	2.11	2.25	2.30	2.35	2.25	1.91	2.05	2.10	2.18	2.06
	P %	0.34	0.32	0.34	0.36	0.34	0.30	0.30	0.32	0.33	0.31
	K %	2.86	2.42	2.20	2.64	2.53	2.40	2.20	2.15	2.30	2.25
	Mg %	0.37	0.47	0.38	0.47	0.42	0.33	0.41	0.37	0.45	0.39
	Mn p.p.m.	201.00	173.00	229.00	218.00	205.00	195.00	180.00	205.00	200.00	195.00
0.6	N %	2.70	2.32	2.30	2.38	2.43	2.50	2.12	2.10	2.18	2.23
	P %	0.36	0.35	0.38	0.41	0.38	0.34	0.32	0.36	0.35	0.32
	K %	3.08	2.64	2.42	2.64	2.70	2.80	2.50	2.35	2.45	2.52
	Mg %	0.48	0.49	0.47	0.48	0.48	0.42	0.40	0.41	0.43	0.42
	Mn p.p.m.	242.00	185.00	277.00	252.00	239.00	215.00	190.00	240.00	220.00	216.00
0.9	N %	2.30	2.30	2.27	2.36	2.31	2.10	2.10	2.08	2.20	2.12
	P %	0.34	0.32	0.36	0.34	0.34	0.32	0.30	0.30	0.34	0.32
	K %	2.20	2.20	2.42	2.20	2.37	2.40	2.00	2.25	2.05	2.18
	Mg %	0.48	0.41	0.40	0.44	0.43	0.43	0.39	0.38	0.41	0.40
	Mn p.p.m.	215.00	151.00	262.00	218.00	212.00	200.00	160.00	230.00	200.00	198.00

**B) Total carbohydrates:**

Generally, spraying Queen Elizabeth rose plants with different concentrations of Complezal fertilizer increased the total carbohydrate content in the leaves than the untreated plants in both seasons, as shown in Table (3). These results could be attributed to the role of all nutrients in this commercial fertilizer at their suitable rate in raising the physiological activity of the plant and consequently increasing the photosynthates products in the leaves. Similar results were obtained by Mantrova and Nikitina (1972), who reported that the optimum N P K rates, stimulated carbohydrate synthesis and accumulation in rose plants.

From the previous mentioned results, it could be concluded that using Complezal fertilizer raised the total carbohydrate content, which is very necessary for the elongation of the vase life of this important cut flowers.

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Table (3): Effect of complexal as foliar fertilization on the total carbohydrates percentages in the leaves of Queen Elizabeth rose plants during the seasons of 1986/1987 and 1987/1988.

Treatments	Nov.	Dec.	Jan.	Feb.
<u>First season 1986/1987.</u>				
0.0	28.75	24.38	27.00	21.25
0.3	30.00	25.13	28.50	25.63
0.6	29.38	24.50	32.50	30.13
0.9	26.25	24.13	27.00	25.13
<u>Second season 1987/1988.</u>				
0.0	29.38	24.75	28.13	22.50
0.3	29.50	25.13	27.80	26.50
0.6	30.15	25.80	33.40	29.75
0.9	27.10	25.60	26.30	24.90

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