

EFFECT OF CUT TYPE AND SOME PRESERVATIVE SOLUTIONS ON THE VASE LIFE OF CUT FLOWERS OF SOME CHRYSANTHEMUM (*Chrysanthemum morifolium*) CULTIVARS.

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ABSTRACT

This investigation was performed under the green house and Lab. conditions of Exp. Res. And Training, King Faisal Univ. to study the effect of some cut types and preservative solutions on the vase life of four chrysanthemum cultivars (Anemon, Pompon, Single and Spider) . The evaluated four cut types were as follows: Flowers with 10 or 20 cm stem with 4 leaves or without leaves on stem. The preservative solutions used were as follows:

- Control
- CCC 20 , 40 and 60 ppm
- Citric acid 30 , 60 and 90 ppm
- Sucrose 2, 4 and 6 % concentration
- Silver nitrate 25 , 50 and 75 ppm

The main findings obtained from this investigation showed that the longest vase life of cut flowers was obtained by cutting flowers with 20 cm stem with four leaves. The evaluated preservative solutions had marked effects on the vase life of cut flowers. Silver nitrate at 50 ppm came in the first rank in extending the vase life of flowers. Silver nitrate at 25 or 75 ppm and Sucrose at 4 % concentration ranked the second or the third in this concern. The interaction between cut type and preservative solutions significantly affected the vase life of flower. The longest vase life for the evaluated four chrysanthemum cultivars were observed by cutting flower with 20 cm stem and four leaves when preserved in silver nitrate at 50 ppm. Also, results revealed that the vase life of Anemon, Pompon, Single and Spider were 21.4, 19.4 , 21.4 and 24.2 days, respectively.

INTRODUCTION

Chrysanthemum morifolium is considered as one of the most important ornamental plants. Its importances not lies only because its flowers are numerous and different in size, shape and colour, but also in its ability to live for long time in vase if preserved in any of preservative solution . Rajacopalam and Khader (1996) treated chrysanthemum flowers (Cv. CO1 and C02) with water (control), 4 % silver thiosulphate, 2 % sucrose, 4 % thiosulphate + 2 % sucrose, 5% Boric acid, 0.5 % citric acid or 0.1 aluminium sulphate for 24 hrs. They found that the longest vase life and least flower damage were obtained with the 0.1 % aluminium sulphate treatment.

Arriaga and Guerrero (1996) studied the effect of different preservative solutions on the vase life of cut flowers of chrysanthemum . They found that 8 hydroxy quinoline citrate + 75 ppm citric acid + 5%

sucrose gave the best results of the vase life, compared with flowers kept in water.

Barman *et al.* (1996) studied the effect of aluminum sulphate and sucrose on vase life of chrysanthemum. They concluded that the vase life was increased with treatment of 0.2 % aluminum sulphate + 3 % sucrose. They also found that aluminum sulphate at 0.1 % + 3 % sucrose came in the second rank, while the lowest vase life was noticed with the control (water).

Deotale *et al.* (1996) found that chrysanthemum cv. Raga flowers extended the vase life to 22 days when treated with 0.1 % aluminum sulphate + 4 % sucrose.

Leejongsuk *et al.* (1996) stated that silver nitrate was the recommended treatment which significantly extended the vase life of flowers.

Song *et al.* (1996) found that preservative solutions containing sucrose 3 % + 8-hydroxy quinoline sulphate at 150 ppm + silver nitrate at 50 ppm extended the vase life by about 10 days, compared with the control. They found that there were wide variations between the tested 8 cultivars in the vase life and also stated that 5% sucrose solution recorded the longest vase life.

MATERIALS AND METHODS

This work was carried out under the conditions of the green house and Laboratory of Agricultural Research and Training Station, King Faisal University, during 1997 season. The purpose was to study the effect of cut type and different preservative solutions on the vase life of cut flowers of four chrysanthemum cultivars, namely Anemon, Pampom, Single and Spidere. For each cultivar, the following factors were studied :

1st- Cut types of flowers:

1- Flowers with 10 or 20 cm stem with or without four leaves on stem.

B- Preservative solutions :

- Control
- CCC 20 , 40 and 60 ppm
- Citric acid 30 , 60 and 90 ppm
- Sucrose 2, 4 and 6 %
concentration
- Silver nitrate 25 , 50 and 75 ppm

Samples of chrysanthemum flowers used in this investigation were taken from 3-years old chrysanthemum plants grown under the green house conditions. Drip irrigation was the used system in the green house and the experimental soil was sandy in texture, poor in nitrogen and organic matter and the pH was 8.3 . NPK fertilizers and trace elements were applied in the form of complex fertilizer "Singral" with irrigation water at the regular intervals of two days. Fertilization program started at two months before flowering. Other agricultural practices as weeding, pests and diseases control were done as the usual manner of cultivation chrysanthemum under the green house conditions.

At flowering, random samples of 208 flowers were cut from each of

the evaluated four chrysanthemum cvs. As the previously mentioned cut type, i.e. 52 flowers for each cut type and divided into 13 groups, each in one of the tested presentative solutions and placed with the preservative solutions in phoem cup. Temperature and relative humidity in the Lab. during keeping period were as follows:

Table1: Temperature and relative humidity in the Lab. during the keeping period of cut flowers

Date	Temperature		Relative humidity (%)
	Minimum	Maximum	
21-27 December	9.4	17.4	74.3
28 Dec - 3 Jan.	11.0	18.4	74.1
4 - 10 January	11.8	18.9	75.0
11 - 17 January	12.8	22.0	75.2
18 - 24 January	14.0	24.3	75.5

Collected data were subjected to the statistical analysis as the technique of analysis of variance for the split plot design as mentioned by Gomez and Gomez (1984). Treatment means were compared using the Newly Least Significant Difference at 5 % level of probability.

RESULTS AND DISCUSSION

Data of the vase life of cut flowers of each one of the evaluated chrysanthemum cultivar as affected by the studied factors and their interaction was presented and discussed separately, as follows:

1- Anemon cultivar:

Data in Table 2 show that the vase life of cut flower for Anemon cv. was significantly affected by cut type of flowers, preservative solutions and their interaction. The longest vase life of cut flowers (23.3 days) was obtained with cutting flowers with 20 cm stem having 4 leaves, it was followed by the treatments of cutting flowers of 10 cm stem with four leaves. With respect to the preservative solution, silver nitrate at 50 ppm was the best in extending the vase life of cut flowers. Silver nitrate at 75 and 25 ppm came in the second ranks. The interaction between cut type and preservative solution had significant effect on the vase life of cut flowers. The treatment of cutting flowers with 20 cm stem with 4 leaves that kept in the silver nitrate at 50 ppm was the longest in keeping quality of cut flowers. Similar observations were reported by Arriaga and Guerrero (1996), Barman *et al.* (1996) and Rajacopalam *et al.* (1996).

2- Pampom cultivar:

Data listed in Table 3 reveal that cut type of flowers of Pampom cv significantly affected the vase life of cut flower. Cutting flowers with part of stem (20 cm) and four leaves recorded the longest vase life of cut flowers. Also the preservative solutions markedly varied among them in their effect on the vase life of the cut flower. Keeping flowers in silver nitrate at 50 ppm resulted in extending the duration of vase life of cut flowers. Sucrose 4 % came in the second rank in this concern . All preservative solutions significantly extended the vase life of cut flowers as compared with the

control (water). The vase life of cut flower was significantly affected by the interaction between the two studied factors. The treatments of cutting flowers with 20 cm from stem with 4 leaves when preserved in silver nitrate at 50 ppm or sucrose 4 % were the best in this respect. Deotale *et al.* (1996) and Leejongsuk *et al.* (1996) came to similar observations.

Table 2: Average of vase life (days) of cut flower of Anemon cv as affected by cutting type of flowers, preservative solutions and their interaction.

Flowers cutting type	Flower with 10 cm stem		Flower with 20 cm stem		Mean
	Without leaves	With 4 leaves	Without leaves	With 4 leaves	
1- Control	11.8	12.8	12.0	12.8	12.3
2- CCC 20 ppm	15.0	13.8	15.8	15.0	14.9
3- CCC 40 ppm	17.0	17.0	18.0	17.5	17.4
4- CCC 60 ppm	12.5	18.5	15.8	19.0	16.4
5- Citric acid 30 ppm	17.0	19.8	19.0	23.0	19.7
6- Citric acid 60 ppm	22.0	25.5	23.3	28.0	24.7
7- Citric acid 90 ppm	18.8	22.8	17.3	23.5	20.6
8- Sucrose 2 %	19.3	21.0	19.5	25.8	21.4
9- Sucrose 4 %	23.3	24.0	23.8	27.0	24.5
10- Sucrose 6 %	21.5	22.8	22.5	23.8	22.6
11- Silver nitrate 25 ppm	25.0	23.3	27.3	25.5	25.3
12- Silver nitrate 50 ppm	30.3	30.8	32.0	33.5	31.6
13- Silver nitrate 75 ppm	25.0	29.0	26.0	28.0	27.0
F. Test	**				**
N-LSD (5 %)	1.4				0.7
Means	19.9	21.6	20.9	23.3	
F. Test	**				
N-LSD (5 %)	0.5				

3- Single cultivar:

The vase life of cut flower for Single cv. as affected by cut type of flowers and preservative solutions as well as their interaction are presented in Table 4. The longest vase life of cut flowers was obtained when flowers were cut with 20 cm stem having 4 leaves. Also, preserving flowers in silver nitrate 50 ppm and sucrose 4 % resulted in extending the vase life of flowers. The combination among both forementioned treatments recorded the best result in extending the vase life of Single flowers. Similar results were obtained with Warman and Bass (1996).

4- Spider cultivar:

In connection with the effect of cut type flowers and preservative solution on the vase life of cut flowers of chrysanthemum of Spider cv., data in Table 5 indicate that both of the studied factors and their interaction had marked effects on the vase life of flowers. The cut of flowers with 20 or 10 cm from stem and 4 leaves resulted in increasing the vase life of cut flowers if compared with the that without leaves. Data also show that silver nitrate at 25 ppm was the first in keeping flower fresh for long time. It was followed by silver nitrate 50 ppm and sucrose 4% concentration. The interaction of cut flowers with 20 cm from stem and 4 leaves and silver nitrate at 50 ppm was

the most favorable treatment, it was followed by the treatment of the same cut type with silver nitrate at 25 ppm and sucrose 4 % concentration. Similar observations were reported by Arriaga and Guerrero (1995) and Barman *et al.* (1996).

Generally, it can be concluded that the vase life of Anemon cv. Was the longest , it was followed by the Single and Spider cvs. , while Pampom ranked the last in this concern. Also the treatment of cutting flowers with 20 cm from stem with 4 leaves and soaking it in silver nitrate at 25- 50 ppm or sucrose 4% concentration was the best in extending the vase life of chrysanthemum cut flowers.

Table 3: Average of vase life (days) of cut flower of Pampom cv as affected by cutting type of flowers, preservative solutions and their interaction.

Flowers cutting type	Flower with 10 cm stem		Flower with 20 cm stem		Mean
	Without leaves	With 4 leaves	Without leaves	With 4 leaves	
Growth substances					
1- Control	11.3	12.0	12.0	12.8	12.0
2- CCC 20 ppm	14.0	15.0	14.8	16.5	15.1
3- CCC 40 ppm	15.0	17.5	15.8	20.0	17.1
4- CCC 60 ppm	14.0	17.5	13.5	18.5	15.9
5- Citric acid 30 ppm	14.5	16.8	15.5	19.0	16.4
6- Citric acid 60 ppm	19.8	22.8	21.0	24.0	21.9
7- Citric acid 90 ppm	18.0	21.0	18.5	21.8	19.8
8- Sucrose 2 %	15.5	19.3	15.3	20.8	17.7
9- Sucrose 4 %	19.8	25.8	19.5	27.8	23.2
10- Sucrose 6 %	17.5	21.8	18.5	21.8	19.9
11- Silver nitrate 25 ppm	22.8	23.8	21.5	23.8	22.9
12- Silver nitrate 50 ppm	25.0	26.8	26.0	28.8	26.6
13- Silver nitrate 75 ppm	22.8	22.5	22.8	24.5	23.1
F. Test	**				**
N-LSD (5 %)	1.6				0.8
Means	17.7	20.2	18.0	21.5	
F. Test	**				
N-LSD (5 %)	0.3				

Table 4: Average of vase life (days) of cut flower of Single cv as affected by cutting type of flowers, preservative solutions and their interaction.

Flowers cutting type	Flower with 10 cm stem		Flower with 20 cm stem		Mean
	Without leaves	With 4 leaves	Without leaves	With 4 leaves	
Growth substances					
1- Control	11.3	12.0	12.3	12.5	12.0
2- CCC 20 ppm	13.5	14.8	13.0	16.0	14.3
3- CCC 40 ppm	17.5	18.8	18.5	19.0	18.4
4- CCC 60 ppm	15.5	18.0	17.3	18.5	17.3
5- Citric acid 30 ppm	18.8	18.5	18.5	20.5	19.3
6- Citric acid 60 ppm	19.8	24.8	20.5	27.0	23.0
7- Citric acid 90 ppm	19.0	24.0	18.5	24.3	21.4
8- Sucrose 2 %	19.5	21.3	18.3	23.8	20.7
9- Sucrose 4 %	24.3	29.3	25.8	29.8	27.3
10- Sucrose 6 %	22.3	26.8	23.0	26.5	24.6

11- Silver nitrate 25 ppm	22.3	24.5	24.8	24.8	24.0
12- Silver nitrate 50 ppm	28.5	29.3	28.8	30.5	29.3
13- Silver nitrate 75 ppm	27.5	24.8	26.8	26.0	26.3
F. Test N-LSD (5 %)	** 0.8				** 0.4
Means	20.0	22.0	20.5	23.0	
F. Test N-LSD (5 %)	** 0.4				

Table 5: Average of vase life of cut flower of Spider cv as affected by cutting type of flowers, preservative solutions and their interaction.

Flowers cutting type	Flower with 10 cm stem		Flower with 20 cm stem		Mean
	Without leaves	With 4 leaves	Without leaves	With 4 leaves	
Growth substances					
1- Control	13.8	15.0	15.0	16.3	15.1
2- CCC 20 ppm	17.3	18.5	18.3	18.3	18.1
3- CCC 40 ppm	18.5	20.8	19.0	22.5	20.2
4- CCC 60 ppm	16.5	19.0	17.5	19.0	18.0
5- Citric acid 30 ppm	20.8	22.5	22.0	22.3	21.9
6- Citric acid 60 ppm	24.0	26.8	24.3	27.5	25.6
7- Citric acid 90 ppm	22.5	28.8	23.3	28.8	25.8
8- Sucrose 2 %	23.8	28.0	24.5	29.0	26.3
9- Sucrose 4 %	26.8	30.8	28.0	29.5	28.8
10- Sucrose 6 %	27.5	27.0	27.0	27.0	27.1
11- Silver nitrate 25 ppm	30.5	28.5	30.8	29.5	29.8
12- Silver nitrate 50 ppm	26.5	31.0	26.8	32.3	29.1
13- Silver nitrate 75 ppm	28.8	29.5	25.5	30.0	28.4
F. Test N-LSD (5 %)	** 1.2				** 0.6
Means	22.8	25.1	23.2	25.5	
F. Test N-LSD (5 %)	** 0.5				

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تأثير أنماط القطع وبعض المحاليل الحافظة على طول عمر الأزهار المقطوفة من بعض أصناف الأزولا
محمود صالح سراج على
قسم البساتين - كلية الزراعة وعلوم الأغذية - جامعة الملك فيصل - المملكة العربية السعودية

تم عمل هذا البحث تحت ظروف البيوت المحمية والمختبر في محطة التدريب والأبحاث الزراعية والبيطرية وذلك لدراسة بعض أنماط القطع المختلفة وبعض محاليل الحفظ على طول عمر الأزهار في 4 أصناف من الأزولا وهم (1- الانيمون ، 2- بامبوم ، 3- المفرد ، 4- العنكبوتى). تم تقييم 4 أنماط من القطع كالتالى أزهار بطول 10 ، 20سم مع 4 أوراق أو بدون أوراق وقد استخدم في التجربة 4 محاصيل كالتالى :

- 1- كنترول ماء عادى
 - 2- السيكوسيل بتركيزات 20 ، 40 ، 60 جزء فى المليون.
 - 3- حمض الستريك بتركيزات 30 ، 60 ، 90 جزء فى المليون.
 - 4- سكروز بتركيزات 2 ، 4 ، 6 % جزء فى المليون.
 - 5- نترات الفضة بتركيزات 25 ، 50 ، 75 جزء فى المليون.
- أظهرت النتائج أن الأزهار ذات الساق 20 سم وبها 4 أوراق استمرت أطول فترة بحالة جيدة فى محلول الحفظ. أما بالنسبة للمقارنة بين محاليل الحفظ من حيث أفضلها لحفظ الأزهار طازجة لفترة طويلة فقد وجد أن نترات الفضة بتركيز 50 جزء فى المليون احتلت المرتبة الأولى فى طول فترة الحفظ يليها نترات الفضة بتركيز 25 جزء فى المليون ثم 75 جزء فى المليون ويلي ذلك السكروز بتركيز 4 % . أما بالنسبة للتفاعل بين نمط قطع أزهار الأزولا والمحاليل الحافظة فقد أظهرت نتائج معنوية ، حيث نجد أن أفضلهم هو قطع الأزهار بساق بطول 20 سم وبها 4 أوراق فى محلول حفظ نترات الفضة بتركيز 50 جزء فى المليون ، بينما كانت الفترة التى عاشتها أزهار الأزولا من الأصناف المختلفة كالتالى: أصناف الانيمون ، بامبوم ، المفرد والعنكبوتى كانت 21.4 ، 19.4 ، 21.4 ، 24.2 يوم على التوالى.