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Evaluation the permanence of flower of Polianthes tuberose L. with using different preservative solutions

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ABSTRACT

Polianthes tuberose L. is one of important cut shoot flowers in Iran and whole of world. Notwithstanding this flower has high potential after harvesting but, it is wilting very soon in houses. One of important new methods to improve quality and quantity of cut shoot flowers is use the preservative solution of flower. For this purpose, a randomized block experiment design with three treatments, four concentration and three replicates was established for increasing lifetime and quality of Polianthes tuberose L. in the greenhouse under uncontrolled environmental conditions. Three preservative solutions of Cobalt chloride, 8-hydroxyqunoline sulphate and ammonium sulphate with saccharose 5% were used. In this study, most amount of dry matter was in treatment of interaction effect of Cobalt chloride (800 ppm) with 8-hydroxyqunoline sulphate (0 ppm) and ammonium sulphate (0.2%). Maximum electrical conductivity of preservative solution was in treatment of interaction effect of Cobalt chloride (600 ppm) with 8-hydroxyqunoline (200 ppm) and ammonium sulphate (0%). Also, most amount of measured brix was in treatment of interaction effect of Cobalt chloride (600 ppm) with 8-hydroxyqunoline (400 ppm) and ammonium sulphate (0%). Maximum lifetime of flowers was in treatment of interaction effect of Cobalt chloride (0 ppm) with 8-hydroxyqunoline (600 ppm) and ammonium sulphate (0.4%).

Keywords: Polianthes tuberose L., preservative solutions, lifetime.

INTRODUCTION

Tuberose (*Polianthes tuberosa* L.) is one of the most popular odorous flowering ornamentals and is an excellent summer blooming flowering bulb well suited to the summer.

It is commercially grown for its attractive and luring cut flowers and also for the production of new bulbs. Floral arrangements are made from its flowers and also used for floral bouquets and for table decorations because the flowers remain effectively fresh and attractive for days. Also,

tuberose produces a showy, conspicuous, fragrant yield of cut flowers of a high marketable value due to the lack of other flowering bulbs in summer and autumn (El-Naggar 1998).

Tuberose (*Polianthes tuberosa* L.), as an ornamental bulbous plant native to Mexico, is one of the most important cut flowers in tropical and subtropical areas. The long spike of flowers is excellent for cut flowers and people like their sweet fragrance (Benschop, 1993).

Tuberose, *Polianthes tuberosa* L. (family: Agavaceae) is an herbaceous perennial, commercially grown for its fragrant cut flowers and for the perfume industry (Edwards, 2006).

Tuberose is native to Mexico and grown in tropical and semi-tropical regions. It is cultivated commercially by bulbs. Leaves are tubular and waxy-white in color and spikes have up to 45 cm long that produce clusters of fragrant waxy white flowers (Hutchinson *et al*., 2004; Wei- Ren *et al*., 2002). Tuberose can be successfully grown in a wide range of soils. Loam and sandy loam soil with proper pH, aeration and drainage is essential for better harvest. The soil should be rich in organic matter and retain sufficient moisture for proper growth, flowering and bulbs' yield (Jowkar and Hayati, 2005). Also, maximum yield is obtained by the use of suitable portions of nitrogen, phosphorous and potassium. Researchers have studied to show immense potential of medicinal and ornamental plants used in various traditional systems (Dhanukar *et al*., 2000). Selection of bed type and its effect on vegetative and reproductive growth in tuberose are the main mental disturbance for procedures.

MATERIALS AND METHODS

This research was conducted in 2011 in Islamic Azad University of shirvan, Iran. Cut shoot flowers with maximum two opened flowers were selected. According to native cut flowers of tropical regions are sensitive to low temperature and must keep between 8-15$^{\circ c}$, thus flowers put in cool air before put them in chemical solution. Then, flowers cut oblique (with 70 cm length) until their surface and water absorption were increased. To prevent decay, all leaves under water surface were cut. Every three shoots were put in one pot. Traits of chlorosis, brix, number of opened flower in day, number of withered flower in day, wet weight, dry weight, electrical conductivity were measured. A randomized block experiment design with four treatments and three replicates was established for increasing lifetime and quality of Polianthes tuberose L. in the greenhouse under uncontrolled environmental conditions. Three preservative solutions of Cobalt chloride, 8-hydroxyqunoline sulphate and ammonium sulphate with saccharose 5% were used.

The designed treatments consisted of 0 (standard), 400, 600 and 800 ppm Cobalt chloride, 0 (standard), 200, 400 and 600 ppm 8-hydroxyqunoline sulphate and 0 (standard), 0.2%, 0.4% and 0.6% ammonium sulphate with saccharose 5%. During the experiment, humidity and temperature of room was 70% and 25±2$^{\circ c}$, respectively. To prevent growth of bacteria, 2-3 drops vaytex added into pots.

Number of opened and withered flower in day was counted. Electrical conductivity of preservative solutions was measured.

Finally, the analysis of data was performed with statistical comparison of averages, using the Duncan's multiple range test method with SPSS software.

RESULTS

Effect on initial flowers of cut shoot Polianthes tuberose L.

The results of these analyses are given in Table 1. Based on this table, treatment of 8-hydroxyqunoline sulphate had significant effect with confidence interval of 95% (P≤0.05). Wilting the flowers in most of treatments was started from sixth day. Two treatments of Cobalt chloride and ammonium sulphate had no significant effect on this trait.

Table1. Analysis of variance for the measured traits

permanence of flower (day)	EC	Wet weight	Number of initial flower	df	SOV
117/3 *	2128635/2 **	203/8 ns	3.33 ns	3	Cobalt chloride (a)
6/1 ns	85982/2 ns	366/4 ns	5.12*	3	8-hydroxyqunoline sulphate (b)
120/1 *	24901020/2 **	307/8 ns	1.58 ns	3	ammonium sulphate (c)
228/6 ns	773864/8 **	2278/7 **	6.79 ns	9	a×b
210/1 ns	6356534/2 **	1410/3 *	3.16 ns	9	a×c
168/1 ns	256907/7 ns	1575/5 **	2.54 ns	9	b×c
893/9 **	2320771/6 **	3595/5 **	15.3 ns	27	a×b×c
1707/3	2766926/1	8523/4	60	128	Error
3451/8	39590642/3	18261/8	97.91	191	Total
30/5	67/9	13/38	29.08		CV (%)

*ns. no significant; **.Significant at 0.01; *. significant at 0.05.*

Effect on wet weight of cut shoot Polianthes tuberose L.

Treatments of interaction effect of Cobalt chloride with 8-hydroxyqunoline sulphate with saccharose, interaction effect of 8-hydroxyqunoline sulphate with ammonium sulphate with saccharose and interaction effect of Cobalt chloride with 8-hydroxyqunoline sulphate with ammonium sulphate had significant effect with confidence interval of 99% (P≤0.01). Interaction effect of Cobalt chloride with ammonium sulphate had significant effect with confidence interval of 95% (P≤0.05). But, each treatment alone had no significant effect on this trait.

The effect of 8-hydroxyqunoline sulphate with saccharose on this trait was contradictory with results of some research such as Monteiro., *et al*, 2002, Niu., *et al*, 2001 and Maitra., *et al*, 2001. They found that this treatment increased wet weight of the flower.

Effect on electrical conductivity (EC) of preservative solutions

Treatments of Cobalt chloride with saccharose, ammonium sulphate with saccharose, interaction effect of Cobalt chloride with 8-hydroxyqunoline sulphate with saccharose, interaction effect of Cobalt chloride with ammonium sulphate with saccharose and interaction effect of Cobalt chloride with 8-hydroxyqunoline sulphate with ammonium sulphate with saccharose had significant effect with confidence interval of 99% (P≤0.01). But, treatments of 8-hydroxyqunoline sulphate with saccharose and interaction effect of 8-hydroxyqunoline sulphate with ammonium sulphate had no significant effect on electrical conductivity of preservative solutions.

Maximum electrical conductivity of preservative solution was in treatment of interaction effect of Cobalt chloride (600 ppm) with 8-hydroxyqunoline (200 ppm) and ammonium sulphate (0%).

Effect on permanence of cut shoot Polianthes tuberose L.

Treatments of Cobalt chloride with saccharose and ammonium sulphate with saccharose had significant effect with confidence interval of 95% (P≤0.05). Interaction effect of Cobalt chloride with 8-hydroxyqunoline sulphate with ammonium sulphate had significant effect with confidence interval of 99% (P≤0.01). Other treatments had no significant effect on this trait.

Table 2. The effects of triple interaction treatments on measured traits

permanence of flower (day)	EC	Wet weight	Number of initial flower	ammonium (%)sulphate	8-hydroxyqunoline (ppm)	Cobalt chloride (ppm)
9/33 bc	76/8 e	57/96 ab	3 a	صفر	0	0
12/33 abc	4/2 e	52/4 ab	2/33 a	0/2		
13/33 abc	8/2 e	49/93 ab	2 a	0/4		
10/66 abc	11/5 e	57/37 ab	2/66 a	0/6		
16/33 abc	116/3 e	51/3 ab	2/66 a	صفر	200	
14/33 abc	4/6 e	66/4 ab	2/66 a	0/2		
10/33 abc	8/6 e	71/22 a	3 a	0/4		
9 c	10/9 e	63/82 ab	3 a	0/6		
11/66 abc	487/7 de	58/56 ab	2/33 a	صفر	400	
14/33 abc	4/7 e	64/01 ab	2 a	0/2		
11/33 abc	8/4 e	64/88 ab	3 a	0/4		
16/66 abc	11/8 e	54/99 ab	2/33 a	0/6		
13 abc	312 e	65/08 ab	2 a	صفر	600	
12/66 abc	4/6 e	53/28 ab	3 a	0/2		
19/33 a	8/1 e	69/25 a	1/66 a	0/4		
10/66 abc	11/7 e	57/67 ab	1/66 a	0/6		
17 abc	809/3 cd	48/67 ab	2 a	صفر	0	400
8/33 c	5/2 e	62/16 ab	3 a	0/2		
9 c	8/5 e	72 a	3 a	0/4		
9/33 bc	11/3 e	51/73 ab	2/33 a	0/6		
19 ab	11/5 e	68/6 a	2/66 a	صفر	200	
12/66 abc	5/7 e	56/55 ab	3 a	0/2		
10/66 abc	9/1 e	60/67 ab	2/66 a	0/4		
9/66 abc	11/2 e	67/82 a	2/66 a	0/6		
11/33 abc	776 cd	56/17 ab	2/33 a	صفر	400	
16/66 abc	5/6 e	74/5 a	2/33 a	0/2		
10/66 abc	9/1 e	60/28 ab	1/66 a	0/4		
7/66 c	11/5 e	59/02 ab	1/66 a	0/6		
11/66 abc	954/3 c	64/73 ab	2/66 a	صفر	600	
8/33 c	5/4 e	66/04 ab	3 a	0/2		
8 c	8/7 e	59/1 ab	3 a	0/4		
17/66 abc	12/1 e	58/91 ab	2/66 a	0/6		
14 abc	1155/3 bc	63/22 ab	2/66 a	صفر	0	600
11/33 abc	4/8 e	69/07 a	2/33 a	0/2		
8/33 c	8/8 e	58/86 ab	2/66 a	0/4		
13 abc	13 e	65/36 ab	2/66 a	0/6		
13/66 abc	1596/3 a	68/81 a	2/33 a	صفر	200	
11 abc	5/3 e	74/26 a	2/33 a	0/2		
9/66 abc	9/1 e	58/26 ab	2 a	0/4		
12/25 abc	11/9 e	63/86 ab	2/25 a	0/6		
17/66 abc	1164 bc	52/39 ab	2 a	صفر	400	
12/66 abc	5/3 e	58/3 ab	1/66 a	0/2		
11/33 abc	9/1 e	61/01 ab	1/66 a	0/4		
12/66 abc	11/4 e	62/04 ab	2/33 a	0/6		
10/66 abc	1059 bc	61/83 ab	2/33 a	صفر	600	
16/66 abc	5/2 e	50/37 ab	2 a	0/2		
8/66 c	8/2 e	36/3 b	1 a	0/4		
13/5 abc	12/3 e	52/83 ab	2/66 a	0/6		
14 abc	854/3 cd	62/65 ab	2/66 a	صفر	0	800
17/66 abc	5 e	73/82 a	2/66 a	0/2		
10/33 abc	9/5 e	58/2 ab	2 a	0/4		
12 abc	11/7 e	69/77 a	3 a	0/6		
8/66 c	1579/3 a	55/84 ab	2 a	صفر	200	
12/66 abc	5/7 e	54/27 ab	2 a	0/2		
7/66 c	8/4 e	57/96 ab	2/33 a	0/4		
12 abc	12/3 e	68/36 a	2/33 a	0/6		
8/66 c	1419/3 ab	55/77 ab	2/66 a	صفر	400	
9/66 abc	5/3 e	66/03 ab	2 a	0/2		
8/66 c	8/8 e	63/08 ab	1/66 a	0/4		
11/66 abc	12/1 e	62/95 ab	2 a	0/6		
9/66 abc	1071/8 bc	70/03 a	2 a	صفر	600	
8/66 c	5/3 e	62/65 ab	2/66 a	0/2		
11 abc	8/7 e	50/72 ab	2/33 a	0/4		
8/33 c	12/6 e	64/51 ab	2 a	0/6		

Maximum lifetime of flowers was in treatment of interaction effect of Cobalt chloride (0 ppm) with 8-hydroxyqunoline (600 ppm) and ammonium sulphate (0.4%).

According to Table 2, Cobalt chloride increased the permanence of cut shoot Polianthes tuberose L.

Finally, lifetime of cut shoot Polianthes tuberose L. was 3 to 5 days but, in this study 24 hours cool air, high humidity and using preservative solutions spatially complex solutions and using saccharose in all treatments increased lifetime of cut shoot Polianthes tuberose L. to 19 days in most of treatments.

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