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Value Addition through Use of Dye Chemicals and Floral Preservatives in Tuberose (*Polianthes Tuberosa* L.) Cv. Double

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Abstract: *The experiment was laid out in a completely Randomized Design in Factorial concept with 24 treatments and replicated thrice. The treatment consisted of eight different colour dye chemicals each of 1000 ppm and three concentrations of floral preservative. The preservative Al_2SO_4 500ppm + sucrose 2% significantly enhanced fresh weight, uptake of water, vase life, minimum physiological loss of weight and loss: uptake ratio. However the preservative Al_2SO_4 250ppm + sucrose 2% showed minimum loss of water and maximum diameter of florets. All edible dye was retained initially good shade expect black ink whereas, effect of different dyeing chemicals and their concentrations were found non-significant on flower qualities and vase life of tuberose. At higher concentration colour and dark shade was obtained quickly except black ink. In case of different dye chemicals, their concentration and duration of absorption found non-significant effect on flower qualities and vase life of tuberose. At higher concentration with higher absorption time obtained dark colour shade of spike.*

Keywords: *Tuberose, dye chemicals, floral preservative.*

1. INTRODUCTION

Tuberose is in great demand for its attractive and fragrant flower spikes. It is commercially cultivated for cut and loose flower spikes due to bright snow white flowers, sweetness of blooms and delicacy of fragrance of this ornamental crop. It finds a prominent place in vases. The research work at various levels shows the effect of dyeing chemical and floral preservative to improve quality and vase life of flower. It is really wonderful to think and imagine having blue, yellow or red flowers instead of white ones in vase or bouquets with longer vase life. If farmers really know this simple technique of artificial colouring, they can earn more returns by realization of higher prices as compared to white cut flowers which they are selling presently. The use of floral preservatives to promote the quality and to extend vase life has been known many years. There are many chemicals (floral preservatives) which could be used certain beneficial effects. So certain chemicals (floral preservatives) 8-HQS (Reddy *et al.,* 1997 and Bhat *et al.,* 2012). Floral preservatives viz., aluminum sulphate along with sucrose improved vase life of spike, highest uptake of water and fresh weight of tuberose spike (Padaganur *et al.,* 2005; Sharma and Devi, 2005; Varu and Barad, 2007, and Mohammadi *et al.,* 2012). Hence, following trials are taken in order to study the effect of dyeing chemical and floral preservatives on quality and vase life of tuberose cv. Double.

2. MATERIALS AND METHODS

The investigation on effect of different dye chemicals and floral preservatives on quality and vase life of tuberose (*Polianthes tuberosa* L.) cv. Double was carried out in the Post graduate Laboratory of Department of Horticulture, College of Agriculture, Junagadh Agriculture University, Junagadh during the year 2012-13. The experiment comprised of eight treatment of dye chemicals (1000ppm) viz., Classic blue (D_1), Kesar yellow (D_2), Apple green (D_3), Pink rose (D_4), Blue ink (D_5), Red ink (D_6), Black ink (D_7) and Green ink (D_8) and three floral preservative treatment viz., Al2SO4 250ppm + 2% sucrose (C_1), Al2SO4 500ppm + 2% sucrose (C_2) and Al2SO4 750ppm + 2% sucrose (C_3) in Completely Randomized Design with factorial concept. There were total twenty four treatment combinations and repeated three times. Sucrose solution of 4 % concentration was prepared by dissolving 40 g sucrose in distilled water and the final volume was made up to one liter (1000 g). Solution of aluminum sulphate 250ppm, 500ppm and 750ppm concentrations were prepared by dissolving 250mg/l, 500mg/l and 750mg/l aluminum sulphate, respectively in one liter distilled water and then made up final volume to one liter. 400mg/l, 600mg/l and 800mg/l, of 8-Hydroxy quinoline

sulphate was prepared by dissolving in little distilled water and then final volume is made up to one liter. Colour solution of 500ppm, 1000ppm and 1500ppm concentrations were prepared by dissolving 500mg/l, 1000mg/l and 1500mg/l of colour dye in one liter of distilled water. Spikes were harvested early in the morning. Glass bottles of 1 liter capacity were taken for holding the solution of known quantity of different chemical preservative and edible dyes solution.

Observations such as fresh weight of spike and cut flower, **p**hysiological loss of weight, uptake of water, loss uptake ratio, diameter florets/ flower (mm), individual vase life of florets in tuberose, vase life, colour shade (initial), colour intensity, colour shade (end experiment), days to colour shade, overall acceptability (marks) were recorded. The data on all qualitative and quantitative parameters were statistically analyzed as per completely randomized design with factorial concept and subjected to the method of analysis of variances as described by Panse and Sukhatme (1985).

3. RESULT AND DISCUSSION

There was non significant effect on fresh weight of spike, physiological loss of weight of spike, uptake of water at the end of vase life, loss of water in spike, loss-uptake ratio of spike, diameter of florets in spike, vase life of spike, overall acceptability marks, colour intensity percentage, days to colour change and the initial colour shade due to different dyeing chemicals. Significantly maximum fresh weight of spike (29.04g.) and minimum physiological loss of weight of spike (5.67 %) at 12^{th} days were recorded in the treatment C_2 ($Al_2 SO_4$ 500ppm + 2 % sucrose) at end of the vase life. Sucrose has been show to act as an ox disable respiratory substrate and anti desiccant and thus increases the cut flower fresh weight obtained by Reddy and Singh (1996), observed that 500ppm aluminum sulphate in combination with sucrose significantly enhanced the fresh weight for longer period in tuberose and reduces physiological loss of spike (Reddy and Singh, 1996). The results were also in agreement with those of Balakrishna *et al.* (1989), Bhaskar *et al.* (1999) and Varu and Barad (2008) in tuberose whereas, maximum uptake of water (146.08g) and minimum loss of water in spike (172.95g) were recorded in the treatment C_2 ($Al_2 SO_4$ 500ppm + 2% sucrose) and C_2 ($Al_2 SO_4$ 250ppm + 2 % sucrose), respectively while, Minimum water uptake ratio of spike (1.13g) was recorded in the treatment C_2 (Al_2SO_4 500ppm + sucrose 2 %) at end of the vase life. The chemical like aluminum sulphate and sucrose might be acted to inhibited vascular blockage and increased absorption of water, ultimately increased the uptake of water in the spike. (Varu and Barad, 2008). The lowest ratio might be due to function of sucrose which supply energy for metabolic processes by preservation moisture stress and maintain the water balances through osmotic potential in spike (Acock and Nichols, 1979). The maximum diameter of florets (41.62 mm) and maximum vase life of florets (12.87 days) were recorded in the treatment C_2 (Al_2SO_4 500ppm + sucrose 2%) at end of vase life. This is might be due to its role in lowering the pH of petal, stabilizing the anthocyanin and acidifying the holding water, thus reducing the bacterial growth and improving water uptake (Gowda, 1990) and it is also good respiratory substrate for the maintenance of osmotic potential for maintaining the water balance. Similar results have been reported by Bhaskar *et. al.* (1999), Varu and Barad (2008), Kumar *et al.* (2010) and Chakarborty *et al.* (2010) in tuberose. While, over all acceptability marks, colour intensity percentage and days to colour change were found non significant due to different floral preservatives.

Table1. *Effect of dye chemicals and floral preservatives on fresh weight of spike, physiological loss of weight of spike, uptake of water, loss of water and loss: uptake ratio of tuberose. cv. Double*

Treatments	Fresh weight of spike (g)	Physiological loss of weight of spike (%)	Uptake of water (g)	Lose of water (g)	Loss: uptake ratio (g)
Dye chemicals					
D_1	25.11	5.81 (32.90)	139.88	175.00	1.19
D_2	24.77	5.84 (33.24)	138.6	177.44	1.20
D_3	25.33	5.77 (32.39)	138.66	175.77	1.18
D_4	25.66	5.77 (32.32)	137.55	175.00	1.21
D_5	25.88	5.75 (32.15)	137.22	176.22	1.21
D_6	25.89	5.76 (32.24)	139.11	179.33	1.19
D_7	25.77	5.76 (32.23)	138.11	175.33	1.21
D_8	25.44	5.82 (32.95)	137.44	179.00	1.22
S.Em.±	0.406	0.502	0.892	1.27	0.02
C.D. at 5 %	NS	NS	NS	NS	NS
CV%	4.78	4.63	1.94	2.17	4.94

Floral preservatives					
C_1	25.66	5.72 (31.79)	135.08	174.20	1.21
C_2	29.04	5.67 (31.23)	146.08	172.95	1.13
C_3	21.75	5.96 (34.64)	133.83	182.75	1.26
S.Em.±	0.249	0.307	0.547	0.7814	0.012
C.D. at 5 %	0.7081	0.8749	1.5555	2.2241	0.0347
CV%	4.78	4.63	1.94	2.17	4.94
Interaction (DXC)					
S.Em.±	0.704	0.87	1.546	2.21	0.034
C.D. at 5 %	NS	NS	NS	NS	NS
CV%	4.78	4.63	1.94	2.17	4.94

Table2. *Effect of dye chemicals and floral preservatives on diameter of florets, vase life, colour intensity, overall acceptability and days to colour shade in tuberose. cv. Double.*

Treatments	**Diameter of florets (mm)**	**Vase life (days)**	**Colour intensity**	**Overall acceptability**	**Days to colour shade**
Dyeing chemicals					
D_1	40.00	12.49	8.88 (77.90)	7.16	1.88
D_2	40.22	12.74	8.82 (76.91)	7.12	1.66
D_3	40.39	12.68	8.92 (78.62)	6.97	1.78
D_4	40.48	12.22	8.83 (76.98)	7.12	1.82
D_5	40.22	12.80	8.79 (67.87)	7.17	1.55
D_6	40.14	12.83	8.54 (76.66)	7.06	1.53
D_7	40.06	12.44	6.96 (43.78)	6.56	1.67
D_8	39.53	12.68	8.06 (78.85)	7.06	1.59
S.Em.±	0.204	0.182	3.13	0.14	0.09
C.D. at 5 %	NS	NS	NS	NS	NS
CV%	1.53	4.32	4.56	4.89	4.99
Floral preservatives					
C_1	41.62	12.15	8.62 (70.32)	7.05	1.76
C_2	39.53	12.87	8.57 (73.06)	6.92	1.65
C_3	39.24	12.80	8.23 (73.19)	7.10	1.62
S.Em.±	0.125	0.111	1.92	0.09	0.05
C.D. at 5 %	0.3555	0.3165	NS	NS	NS
CV%	1.53	4.32	4.56	4.89	4.99
Interaction (DXC)					
S.Em.±	0.125	0.314	5.42	0.25	0.15
C.D. at 5 %	NS	NS	NS	NS	NS
CV%	1.53	4.32	4.56	4.89	4.99

Table3. *Effect of dye chemicals and floral preservatives on end of the experiment of tuberose. cv. Double.*

Treatments	**Different concentration of preservatives**		
Dye Chemicals	Al2SO4 250 ppm + 2% Sucrose (C_1)	Al2SO4 500 ppm + 2% Sucrose (C_2)	Al2SO4 750 ppm + 2% Sucrose (C_3)
D_1 (Classic blue)	Sky blue	Sky blue	Sky blue
D_2 (Kesar yellow)	Chartreuse	Chartreuse	Chartreuse
D_3 (Apple green)	Turquoise	Turquoise	Turquoise
D_4 (Pink apple)	Pink peach	Salmon	Pink peach
D5 (Blue ink)	Blue	Blue	Blue
D6 (Red ink)	Blush pink	Shell pink	Blush pink
D7 (Black ink)	White	White	White
D_8 (Green ink)	Seaform	Spring green	Spring green

4. SUMMARY

It can be concluded that the preservative Al_2SO_4 500ppm + sucrose 2% was significantly enhanced the fresh weight, uptake of water, vase life and also found minimum physiological loss of weight and loss: uptake ratio. Whereas, the effect of different dye chemicals were found to be non-significant on flower qualities and vase life of tuberose. All edible dyes were retained initially good shade expect black ink.

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