

Research Paper :

Effect of different household treatments on the weight of selected flowers during their vase life

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ABSTRACT

Avenues of decoration with fresh (cut) flowers are increasing and people are finding it as giving handsome returns. So, the present study was designed to study the effect of household treatments on the weight of selected flowers during their vase life and to recommend specific treatments for increasing vase life of selected cut flowers. For the study, five commonly used flowers for making flower arrangements and five household treatments were selected. Results of the study revealed that maximum change in the weight of rose flower (128.94%) was found with the treatment lemon + household bleach, on the 3rd day. In case of carnation also, the maximum change (133.33%) was observed with the same treatment but on the 4th day. For the gladiolus flowers, the maximum per cent change (116.03%) in weight was observed in case of flowers treated with Sugar + Household Bleach on the 5th day. In case of gerbera flowers, the maximum change in weight (118.60%) was observed in the control group on the 2nd day. The treatment Sugar + Household Bleach resulted in maximum change in weight (104.06%) of tuberose on the 2nd day.

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Love for flowers is a universal phenomenon, and their demand is increasing day-by-day due to growing western life style in the society. In present days, more and more people are buying flowers as they have become almost an essential part of all rituals in our society. They are required for all the functions and festivals in the family for decoration purpose as these flowers symbolize with 'Welcome' for guests and 'Happiness' for personal gatherings. For all the purposes of celebrations and decorations, we love to use fresh flowers. Using flowers in decoration has its importance in adding colour, fragrance, variety and life to the surroundings in addition to giving a welcome message to the visitors and guests.

Flowers are a part of our lives and arranging flowers gives splashes of colour and vibrancy in homes as well as in public and commercial places. The term "cut flower" is used for a flower, which is cut along with portion of stem. Major cut flowers, which dominate the world flower trade are rose, carnation, gerbera, orchids, gladiolus, lilies, anthurium and gypsophila etc. The appearance, quality and longevity of plants depend upon the conditions of cultivation, harvest time and post harvest handling. Bhaskar *et al.*, 1999) conducted a study on the effect of mineral salts namely, aluminum sulphate and calcium nitrate on vase life of tuberose. They reported that these

mineral salts were found to delay the senescence of cut tuberose by increasing water uptake and reducing the water loss leading to increased fresh weight and vase life. Prolonging life of cut flowers has always been a priority of florists, decorators and homemakers because fresh flowers, though attractive in their beauty are expensive, short-lived and available only during a particular season. Singh *et al.* (2003) revealed in their study on vase life and quantity of China aster flowers as influenced by selected holding solutions. The fresh weight of cut stems increased on 3rd and 6th days. The holding solutions were found beneficial in increasing the vase life and quality of cut flowers over control. Increase in fresh weight is an indicator of prolonged vase life and decreasing trend in weight of cut flowers leads to senescence. Hence, the present study was planned with the following specific objectives: to study the effect of household treatments on the weight of selected flowers during their vase life and to recommend specific treatments for increasing vase life of selected cut flowers.

METHODOLOGY

Selection of flowers:

Five most commonly used flowers selected were; Gerberas, Roses, Carnations, Tuberose, Gladiolus.

Selection of household treatments:

For performing the experiments, six household treatments including one control group i.e. normal tap water were selected. The selected treatments included:

Control group (T_0):

In this, normal tap water was taken. In 1000 ml capacity conical glass flask, 1000 ml of normal tap water was taken with the help of measuring cylinder.

Aspirin (T_1):

In this treatment two crushed Aspirin tablets were added in 1000 ml of water in the conical glass flask. The crushed Aspirin tablets were stirred well before using the vase solution.

Listerine (T_2):

In this treatment, 1000 ml of normal tap water was poured in the glass flask with the help of measuring cylinder and then one ounce of listerine mouthwash was added and stirred well before using.

Sugar + Household bleach (T_3):

In this treatment, first 1000 ml of normal tap water was poured in the conical glass flask with the help of measuring cylinder and then 3 drops of liquid household bleach and 1 teaspoon of sugar were added and mixed well before using.

Lemon + Household bleach (T_4):

In this treatment, in 1000 ml capacity conical glass flask first 1000 ml of normal tap water was poured with the help of measuring cylinder and then 3 drops of liquid household bleach and 1 teaspoon of lemon juice were added and stirred well.

Sugar + Lemon + Household bleach (T_5):

In this treatment, in 1000 ml capacity conical glass flask, 1000 ml of normal tap water was poured with the help of measuring cylinder and then 2 tablespoons of fresh lemon juice, 1 tablespoon sugar and $\frac{1}{2}$ teaspoon of liquid household bleach were added to the water and mixed properly (Anon., 2000).

Observations recorded:

The experiments were conducted in Punjab Agricultural University, Ludhiana in a cool place at a constant temperature of 24°C away from direct sun and wind. For each treatment, two flowers with 40 cm long stem were kept in glass flasks filled with water and treatment along with one flask filled with normal tap water

(control group). Each experiment was repeated twice. This procedure was used for all five types of flowers, which were selected for the experiment. The observations which were recorded during the experiments were as follows:

Weight of flowers:

For all five types of flowers, stem length was same i.e. 40 cm but their weight was different from one another as the thickness of stem varied and buds of flowers were different in sizes and flowers contained different number of petals. On the first day without placing the flower stems in water, their weight was taken with the help of electronic weighing machine and that weight was entitled as 'Fresh weight' on '0' day. After weighing all the flower stems, they were put in the conical glass flasks containing treatments. Then next day before the treatment was changed again the weights of all the flower stems were recorded and after that fresh water and fresh treatment were added in the flasks. The two flower stems of every flask had been marked the number 1 and 2, so that no confusion happens during their observations.

Vase life of flowers:

Vase life of flowers was counted from the first day when the flower was very fresh till the last day, when flower seemed to be totally wilted. All those days were counted as 'Vase life of flowers'. During this period, freshness of flowers was noted down under four categories namely, very fresh, fresh, slightly wilted and totally wilted. The freshness was noted till the day, when flowers seemed to be totally wilted.

FINDINGS AND DISCUSSION

The results are discussed under the following headings for each flower:

Change in weight of gerbera flowers:

The weight of flowers was taken every day and the per cent change is given in the Table 1. It can be observed that the maximum change in weight of gerbera flowers in the control group (T_0) was to the tune of 118.60 per cent on the 2nd day. In case of flowers treated with Aspirin the maximum increase in their weight (112.76 per cent) was also observed on 2nd day. In case of flowers kept in Listerine, the maximum increase in the weight was to the tune of 115 per cent on the 2nd day. In case of Sugar + Household Bleach, Lemon + Household Bleach and Sugar + Lemon + Household Bleach, the maximum change in weight was observed to be 113.04, 111.65 and 111.71 per cent, respectively.

Table 1: Effect of selected treatments on per cent change in weight of gerbera flowers

Days	Treatments					
	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
0	-	-	-	-	-	-
1	109.30	107.44	108.00	106.95	107.76	105.40
2	118.60	112.76	115.00	112.17	111.65	111.71
3	110.46	107.44	109.00	113.04	106.79	108.10
4	98.83	103.19	104.00	111.30	102.91	105.40
5	93.02	98.93	97.00	110.43	103.88	110.81
6	89.53	93.61	90.00	108.69	100.00	106.30
7	86.04	88.29	82.00	106.08	97.08	103.60
8	79.06	79.78	82.00	100.00	92.23	109.00
9		74.46	74.00	98.26	87.37	108.10
10		65.95	66.00	92.17	82.52	104.50
11				86.95	77.66	100.00
12				81.73	71.84	95.49
13				76.52	69.90	93.69
14				72.17	64.07	90.09
15				69.56	58.25	84.68
16						78.37
17						72.07
18						65.76
t-value	-	0.70	0.83	0.26	1.30	0.12

T₀-Control group, T₁-Aspirin, T₂-Listerine, T₃-Sugar + Household bleach, T₄Lemon + Household bleach, T₅Sugar + Lemon + Household bleach

It can be further observed from the table that the trend of increase in weight can be observed for 3 days, 4 days, 4 days, 8 days, 6 days and 11 days in case of T₀, T₁, T₂, T₃, T₄ and T₅, respectively. After this period, there is declining trend in the weight of flowers which ultimately lead to senescence. It may be noted that maximum weight gain was observed in case of tap water *i.e.* control group. It may be further observed that flowers kept in T₅ showed weight gain for maximum number of days *i.e.* 11 days which indicated longer vase life. The minimum weight that was observed on the last day as 79.06, 65.95, 66.00, 69.56, 58.25 and 65.76 per cent for T₀, T₁, T₂, T₃, T₄ and T₅, respectively. Calculated 't' values showed non-significant differences between various treatments for change in weight of gerbera flowers over the control group. Chen *et al.* (2004) conducted a study on the effect of calcium chloride on preservation of cut-flowers of gerbera. The results of their study that an increase in the fresh weight and better freshness retention of the cut flowers were in the line of the present study.

Change in weight of rose flowers:

It can be observed from Table 2 that the highest increase in weight of rose flowers in the control group (T₀) was to the tune of 124.44 per cent on the 3rd day. In case of flowers treated with Aspirin the maximum change

in weight (120 per cent) was observed on 2nd day, which remained same on 3rd day also. It can be further observed that out of all the treatments, T₄ *i.e.* Lemon + Household Bleach showed maximum increase in the weight of rose flowers which was to the tune of 128.94 per cent on 2nd and 3rd day. In case of flowers kept in Sugar + Household Bleach, the maximum increase in the weight was to the tune of 120 per cent on the 2nd day and in T₂ *i.e.* In Listerine, the maximum change in the weight was found on 2nd day *i.e.* 125 per cent.

It can be further observed from the table that the trend of increase in weight can be observed for 5 days, 5 days, 4 days, 4 days, 5 days, 2 days in case of T₀, T₁, T₂, T₃, T₄ and T₅, respectively. After this period, there was gradual declining trend in the weight of rose flowers which ultimately lead to senescence. Knee (2000) also reported that longer flower life and higher gain in fresh weight of roses were observed with use of biocides.

Change in weight of carnations:

It can be concluded from Table 3 that maximum weight gain was observed in case of water mixed with Lemon + Household Bleach. The minimum weight that can be observed T₀, T₁, T₂, T₃, T₄ and T₅.

The calculated t-value shows that the difference in change in weight of rose flowers was significant at 1%

Table 2 : Effect of selected treatments on per cent change in weight of rose flowers

Days	Treatments					
	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
0	-	-	-	-	-	-
1	117.77	113.33	115.90	110.00	118.42	110.63
2	122.22	120.00	125.00	120.00	128.94	102.12
3	124.44	120.00	118.18	118.00	128.94	93.61
4	111.11	104.44	100.00	102.00	110.52	93.61
5	106.66	100.00	90.90	96.00	107.89	89.36
6	95.55	97.77		84.00	94.73	80.85
7	86.66	84.44		78.00	92.10	72.34
8	80.00	73.33		70.00	78.94	68.08
9	80.00	57.77		70.00		68.08
10	71.11			68.00		65.95
11	57.55			60.00		61.70
12				52.00		59.57
13				44.00		53.19
14				28.00		48.93
15						34.04
t-value	-	0.11	1.30	1.66*	1.23	2.58***

* and *** indicate significance of values at P=0.10 and 0.01 respectively

T₀-Control group, T₁-Aspirin, T₂-Listerine, T₃-Sugar + Household bleach, T₄-Lemon + Household bleach, T₅-Sugar + Lemon + Household bleach

Table 3 : Effect of selected treatments on per cent change in weight of carnation flowers

Days	Treatments					
	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
0	-	-	-	-	-	-
1	111.32	109.43	110.25	109.09	116.66	111.32
2	115.09	111.32	115.38	112.72	122.91	116.98
3	113.20	111.32	115.38	116.36	127.08	120.75
4	113.20	113.20	117.94	120.00	133.33	126.86
5	109.43	115.09	115.18	121.81	131.25	124.41
6	105.66	116.98	112.82	116.36	127.08	120.75
7	103.77	116.98	110.25	116.36	125.00	118.32
8	101.88	111.32	107.69	114.54	122.91	116.98
9	98.41	107.54	105.12	112.36	116.66	116.98
10	98.11	105.66	100.00	111.54	114.58	113.20
11	98.11	103.77	89.74	110.90	110.41	107.54
12	90.56	96.22	82.05	105.45	108.33	101.88
13	88.67	90.56	66.66	96.36	106.25	100.00
14	75.47	77.35	53.84	89.09	102.08	82.45
15	67.92	83.01	51.28	74.54	93.75	84.90
16	58.49	79.24	46.15	72.72	87.50	77.35
17	49.05	64.15		65.45	77.08	66.03
18		56.60		50.90	68.75	56.60
19		41.50		49.09	60.41	45.28
20				40.00	37.50	
21				32.72		
t-value	-	0.19	0.53	0.27	1.35	0.86

T₀-Control group, T₁-Aspirin, T₂-Listerine, T₃-Sugar + Household bleach, T₄-Lemon + Household bleach, T₅-Sugar + Lemon + Household bleach

level of significance for treatment T_5 i.e. Sugar + Lemon + Household bleach and 10% level of significance for treatment T_3 i.e. Sugar + Household Bleach when compared to the control group. Whereas, for other treatments, it was found to be non-significant.

After the flowers are kept in vase filled with water, the treatments, they absorbed some water from the vase and remained fresh. It can also be observed from the Table 3 that the highest change in weight of carnation flower in the control group (T_0) was to the tune of 115.09 per cent on 2nd day. In case of flowers treated with Aspirin the maximum change in their weight (116.98 per cent) was observed after 7th day. It can be further observed that out of all the treatments, T_4 i.e. Lemon + Household Bleach showed maximum change in the weight of carnation flowers which was to the tune of 133.33 per cent. In case of flowers kept in Sugar + Household Bleach, the maximum increase in weight was to the tune of 121.81 per cent on the 5th day.

It can be further observed from the table that the trend of increase in weight was observed for 8 days, 11 days, 10 days, 12 days, 14 days and 13 days in case of T_0 (control group), T_1 (Aspirin), T_2 (Listerine), T_3 (Sugar + Household Bleach), T_4 (Lemon + Household Bleach), T_5 (Sugar + Lemon + Household Bleach), respectively. After this period, there was declining trend in the weight of flowers which ultimately lead to senescence. It may be concluded that maximum weight gain was observed in case of water mixed with Lemon + Household Bleach.

The minimum weight that was observed on the last day was 49.05, 41.50, 46.15, 32.72, 37.50 and 45.28 per cent of original weight for T_0 , T_1 , T_2 , T_3 , T_4 and T_5 , respectively. Calculated value of t-test came out to be

non-significant for all the treatments over control group. It may be concluded that in case of carnation flowers the selected treatments were not found to be effective for increasing the weight of flowers.

Change in weight of tuberose flowers:

After the flowers were kept in vase filled with water the treatments, absorbed some water from the vase and remained fresh. It can be observed from Table 4 that the maximum change in weight of tuberose flowers in the control group (T_0) was 103.13 per cent on the 2nd day which remained same on the 3rd day also. In case of flowers treated with Aspirin, the maximum change in their weight (102.84 per cent) was observed after 1st day. It can be observed that in T_2 i.e. Listerine maximum increase in weight of tuberose flowers was 102.98 per cent on the 3rd day. It can be further observed that out of all the treatments, T_3 i.e. Sugar + Household Bleach showed maximum change in the weight of tuberose flowers which was to the tune of 104.06 per cent. In case of flowers kept in T_4 i.e. Lemon + Household Bleach, the maximum change in weight was to the tune of 102.57 per cent on the 2nd day.

It can be further observed from the table that the trend of increase in weight was observed for 5 days, 4 days, 5 days, 6 days, 6 days and 6 days in case of T_0 (control group), T_1 (Aspirin), T_2 (Listerine), T_3 (Sugar + Household Bleach), T_4 (Lemon + Household Bleach) and T_5 (Sugar +Lemon + Household Bleach), respectively. After this period, there was declining trend in the weight of flowers which ultimately lead to senescence. It may be concluded that maximum weight gain was observed in case of water mixed with sugar + household bleach which

Table 4 : Effect of selected treatments on per cent change in weight of tuberose flowers

Days	Treatments					
	T_0	T_1	T_2	T_3	T_4	T_5
0	-	-	-	-	-	-
1	101.56	101.55	101.62	101.54	101.54	101.31
2	103.13	102.84	102.43	104.06	102.57	103.14
3	103.13	102.33	102.98	103.75	102.31	103.41
4	102.87	100.77	102.16	103.75	102.05	103.14
5	101.04	99.74	100.81	103.12	101.02	101.31
6	99.47	98.96	99.18	100.93	100.25	100.00
7	98.17	98.18	97.83	99.37	99.74	99.21
8	96.86	96.63	96.74	98.75	98.45	98.16
9	95.56	95.59	94.85	96.87	97.68	96.58
10	93.47	89.63	93.22	95.93	96.40	95.27
11	90.07		92.68	90.62	95.11	90.81
t-value	-	0.03	0.05	0.71	0.71	0.36

T_0 -Control group, T_1 -Aspirin, T_2 -Listerine, T_3 -Sugar + Household bleach, T_4 -Lemon + Household bleach, T_5 -Sugar + Lemon + Household bleach

could help the flowers to remain fresh for a longer period of time.

The minimum weight which was observed on the last day as 90.07, 89.63, 92.68, 90.62, 95.11 and 90.81 per cent for T_0 , T_1 , T_2 , T_3 , T_4 and T_5 , respectively. Calculated values of t-test were found to be non-significant for all types of treatments over control group. Hence, the selected treatments did not have any significant effect on the change in weight of tuberoses.

Change in weight of gladiolus flowers:

After the flowers were kept in vase filled with water, they absorbed some water from the vase and remained fresh. It can be observed from Table 5 that the maximum change was in weight of gladiolus flowers in the control group (T_0) to the tune of 108.25 per cent on the 3rd day. In case of flowers treated with Aspirin, the maximum change in their weight (105.94 per cent) was observed after 1st day. It can be further observed that out of all the treatments, T_3 i.e. Sugar + Household Bleach showed maximum change in the weight of gladiolus flowers which was to the tune of 116.03 per cent. In case of flowers kept in T_4 i.e. Lemon + Household Bleach, the maximum change in weight was to the tune of 105.94 per cent on the 2nd day.

It could be further observed from the table that the trend of increase in weight was observed for 4 days, 3 days, 3 days, 9 days, 5 days and 2 days in case of T_0 , T_1 , T_2 , T_3 , T_4 , T_5 , respectively. After this period, there was declining trend in the weight of flowers which ultimately

lead to senescence. It may be concluded that maximum weight gain was observed in case of water mixed with lemon + household bleach which helped the flowers to remain fresh for a longer period of time.

The minimum weight observed on the last day was 71.65, 65.34, 74.86, 68.86, 74.25 and 58.51 per cent for T_0 , T_1 , T_2 , T_3 , T_4 and T_5 , respectively. T-test showed that selected treatments which were used for gladiolus flowers did not have any significant difference in the weight of flowers over control group.

Recommendations of specific treatments for selected flowers:

The data presented in Table 6 show the comparison of various treatments on the vase life of selected flowers. The perusal of the table shows the following:

- The most effective treatment for roses was sugar + lemon + household bleach followed by sugar + household bleach.
- For carnation the most effective treatment recommended was sugar + household bleach followed by lemon + household bleach.
- For gladiolus flowers, the most effective treatment recommended was sugar + household bleach, followed by sugar + lemon + household bleach.
- The most effective treatment for gerbera flowers was sugar + lemon + household bleach, followed by sugar + household bleach.

For tuberoses selected treatments do not show much effect on the vase life of flowers.

Table 5: Effect of selected treatments on per cent change in weight of gladiolus flowers

Days	Treatments					
	T_0	T_1	T_2	T_3	T_4	T_5
0	-	-	-	-	-	-
1	104.12	103.96	104.27	103.77	104.45	104.25
2	107.22	105.94	106.95	105.66	105.94	101.59
3	108.25	102.97	104.27	107.07	101.98	99.46
4	101.03	95.54	98.93	112.73	100.00	95.21
5	92.78	89.60	96.79	116.03	100.49	96.80
6	86.60	86.63	92.51	111.79	97.52	94.14
7	77.83	78.21	87.16	107.54	90.59	91.48
8	71.65	73.26	81.28	103.77	89.60	88.82
9		65.34	74.86	103.30	85.14	81.91
10				94.81	77.22	76.59
11				87.73	80.19	67.55
12				81.60	74.25	67.02
13				75.47		58.51
14				68.86		
t-value	-	0.67	0.07	0.77	0.25	1.12

T_0 -Control group, T_1 -Aspirin, T_2 -Listerine, T_3 -Sugar + Household bleach, T_4 -Lemon + Household bleach, T_5 -Sugar + Lemon + Household bleach

Table 6 : Comparison of various treatments on the vase life of selected flowers

Treatments	Vase life									
	Gerbera		Rose		Carnation		Tuberose		Gladiolus	
	Days	% increase over control group	Days	% increase over control group	Days	% increase over control group	Days	% increase over control group	Days	% increase over control group
T ₀	8	0.00	10.5	0.00	18	0.00	12	0.00	9	0.00
T ₁	10.5	31.25	9.5	-9.04	17.5	-2.77	10.5	-12.50	9.5	5.55
T ₂	9.5	18.75	6	-33.33	17	-5.55	11.5	-4.16	10	11
T ₃	15.5	93.75	13.5	28.57	21	16.66	11.5	-4.16	14	55.55
T ₄	14	75.00	9	-14.30	20.5	13.88	12	0.00	12.5	38.88
T ₅	19	137.50	15.5	47.61	19	5.55	11.5	-4.16	13	44.44

T₀-Control group, T₁-Aspirin, T₂-Listerine, T₃-Sugar + Household bleach, T₄-Lemon + Household bleach, T₅-Sugar + Lemon + Household bleach

Conclusions:

From the study, it was found that maximum change in the weight of rose flower (128.94%) was found in the treatment lemon + household bleach, on the 3rd day. In case of carnation also, the maximum change (133.33%) was observed in the same treatment but on the 4th day. For the gladiolus flowers, the maximum per cent change (116.03%) in weight was observed in case of flowers treated with Sugar + Household Bleach on the 5th day. In case of gerbera flowers, the maximum change in weight (118.60%) was observed in the control group on the 2nd day. The treatment Sugar + Household Bleach resulted in maximum change in weight (104.06%) of tuberose on the 2nd day. It may be concluded that the various treatments selected had a positive effect on the weight of the vase life of the selected cut flowers.

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