BIBLIOGRAPHY

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ABSTRACT

This study was conducted to determine the best holding solutions that can effectively prolong the vaselife of calla lily cutflowers; and to determine the best holding solutions/s that can further prolong the opening of calla lily.

Calla lily were held in different holding solutions containing distilled water only; 20% sucrose + 5 ml chlorox/ li water 20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water; 50% uncola pop drink (sprite) + 5 ml chlorox/ li water; 150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/li water.

Results show that distilled water only is the best for calla lily cutflowers in prolonging the vaselife and exhibits good stem quality.

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INTRODUCTION

Calla lilies are known as the arum lily, this elegant, trumpet shaped blossom originated in Africa and symbolizes “magnificent beauty” in the language of flowers. It is unique and elegant flowering plant that makes a spectacular addition to the home garden. They are also very popular for bridal bouquets and cut flower arrangement. Calla lilies are quite common; the white callas referred to as the local indigenous calla lilies that are grown in Cordillera particularly in Benguet and Mt. Province. These plants are also available in an array of beautiful colors including shades of green, pink, purple, yellow, and orange. Callas are large flowers with thick, waxy petals and solitary 6-8 inch flower heads that make excellent cutflowers and blooming petals. Considering the fact that calla lilies grow from funny-looking knobby tubers, its difficult to believe that each will produces 10-30 elegant sculptural flowers.

Calla lily of the genus *Zanthedeschia* belongs to the family *Aracea.* It is more closely related to caladium and does not have the same habit and cultural requirement as found in the liliums. There are six known species of the genus such as *Zanthedeschia aethipica*, the common white calla lily; *Zanthedeschia elliottiana*, the yellow calla*; Zanthedeschia albumaculata*, the cream flowers*; Zanthedeschia peantandii*, deciduous or gold; *Zanthedeschia rehmanii*, the pink and purple calla; and *Zanthedeschia jucanda*, deciduous flower and spotted, but not use as horticultural.

The study was conducted to determine the best holding solutions that can effectively prolong the vaselife of calla lily; and to determine the best holding solution/s that can further prolong the opening of calla lily cutflowers.

The study gave additional information to farmers and florists in prolonging the vaselife of calla lily by using holding solutions for newly harvested calla lily.

Many research findings claim that solutions when properly used will delay wilting, discoloration, yellowing of leaves of some cutflowers which will ultimately delay senescence, thus prolonging vaselife.

Postharvest techniques to prolong vaselife are important in cutflower production and marketing in advanced countries. Cutflowers are stored using either controlled atmosphere and refrigerated storage trucks and vans along with preservatives for opening and lengthening the life of cutflowers.

Sucrose is important in the holding solution of cutflower. Sucrose is the most common food source used in floral preservatives. It provides energy to sustain flowers longer and to open flower in the bud stage. One to two percent sucrose is the standard amount used in floral preservatives.

The study was conducted at the Floriculture Room, College of Agriculture, Benguet State University, La Trinidad, Benguet from March 05 to March 23, 2010.

REVIEW OF LITERATURE

The Plant

Calla lily of the genus *Zanthedeschia* belongs to the family *Aracea*. It is more closely related to caladium and does not have the habit and cultural requirements as found in the *liliums*.

There are six known species of the genus such as *Zanthedeschia. aethiopiea*, the common white calla lily; *Zanthedeschia elliottiana*, the yellow calla*; Zanthedeschia albumaculata*, the cream flowers*; Zanthedeschia peantandii*, deciduous or gold; *Zanthedeschia rehmanii*, the pink and purple calla; and *Zanthedeschia jucanda*, deciduous flower and spotted.

Cut flower yield is dependent on cultivar, tuber size and growth regulator applications. One to three flowers can be exceeded from 1-5 diameters tuber. The flowers are green at macobud stage and gain full color upon opening. After pollination flowers often depend on the color, begin to re-green and close (Rimando, 1982).

Floral preservatives

Floral preservatives are needed to prolong the vase life of all cut flowers. Its component contains carbohydrates, germicides, ethylene inhibitors, growth regulator, and some mineral compounds. Flowers remain fresh longer if they are placed in a floral preservative solution. Such solutions should be prepared according to the instructions on the package. It is important not to exceed the recommended dosage, for too high concentration of the preservative may be harmful to flowers. The floral preservative should not be used for flowers other than those mentioned in the manufacturers instruct

should not be used for flowers other than those mentioned in the manufacturers instructions. (Nowak and Rudnicki, 1997).

Nicholas (1973), found that sucrose is the major component of floral preservatives and it is evident that the carnation will respond before their endogenous sugar is used up.

According to Rimando and Maralit (1980), as cited by Paet (1984), to successfully open cut flowers buds to quality blooms comparable with field-opened flowers, the presence of an optimum level of sucrose must be provided.

Sucrose increases the fresh weight and longevity of cut flowers and it also reduces moisture stress, in cut flower by decreasing the size of leaf stomata (Marousky, 1975).

Rogers (1973) as cited by Alacyang (1998), found that using citric acid as one of the preservatives may improve water balance and reduce stem plugging in cut flowers.

Ladilad (1980), found out that 50% 7- up (carbonated soda) significantly lengthened the vase life of cut flowers compared to 50% 7 –up, 0.01AL (SO4), 2.5 % sucrose and 1-drop phisohex and distilled water.

Longevity of the Flower

According to Laurie (1976), the rate of respiration has a bearing on the length of postharvest life of any cut flower.

The turgidity of plants and cut flowers is dependent upon a balance between the rate of water loss or utilization and of water supply. Turgidity is also necessary for the continuance of normal metabolic activity in cut flowers as it is needed for the development of flower buds bloom maturity at high level as cited by Bernard (1990).

Senescence

A fresh cut flower is still a living and actively metabolizing entity whose life span is subsequently terminated by senescence, as distinguished from aging which involves gradual changes that are deteriorative but not lethal in them (Leopold, 1975). Flowers remaining on plant are also senescing but a much flower pace.

Senescence is a concept of physiological and biochemical process. The initial event of senescence remains the development of some cut flowers like carnation and rose, a climacteric rise in ethylene production signifies the promotion of senescence. Thereafter, a change in permeability of the tissues can be detected (Mayak, 1987).

MATERIALS AND METHODS

The materials used in the study are the newly harvested calla lily at 25% anthesis, pruning shear, catsup bottles, stirring rod, beaker, and portable pH meter.

The newly harvested calla lily cut flowers was obtained from the florist in Baguio City at 25% anthesis, the stem ends was re-cut about 3-4 cm at the basal ends and the slim ends where soaked for one night in tap water only before holding them in the different solutions stem length at about 45 cm.

The study was laid out in factorial Completely Randomized Design (CRD) with one (1) sample cut flower per replication and four replication per treatment combination. The volume of holding was 300 ml per bottle. The cut flower was held in ambient room condition for observation. The factor A was the variety while the Factor B was the treatments.

Factor A

V_1- *Zanthedeschia aethiopiea* (white)

V_2- *Zanthedeschia elliottiana* (green)

Factor B

T_1- control (distilled water only)

T_2- 20% sucrose + 5 ml chlorox/ li water

T_3- 20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water

T_4- 50% uncola pop drink (sprite) + 5 ml chlorox/ li water

T_5- 150 ppm ascorbic acid + 8% sucrose + 1 ml chlorox/ li water

The data gathered were as follows:

1. Vaselife. This was the number of days covering the period from holding the cut flower in the vase/ container to the termination of the aesthetic value of the flower.

2. Initial and final pH of the holding solutions. The initial pH was taken just before the immersion of cutflower stem ends in the holding solutions, while the final pH was taken upon the termination of the observations.

3. Stem quality rating. The stem quality rating of each flower was determined daily by using the following index.

Rating	Description (cm)
1	deep green, no injury
2	deep green and browning at the base at least less than 2.54
3	stem browning/ rotting at the base least less than 3.81
4	stem browning/ rotting at the base at least less than 5.08

4. Temperature. The temperature (minimum and maximum) in the laboratory was recorded daily in °C.

5. The number of days from immersion of the stem ends to full flower opening. This was counted in the number of days from immersion of stem ends to full opening of the cutflower.

6. Number of days from full opening to the onset of senescence. This was counted by the number of days covering the period from full opening to flower senescence (utilize, browning, discoloration).

7. Flower opening index. The percentage of flower opening of each flower was noted daily using the following index.

Index	Description
1	1-25% open
2	26-50% open
3	51-75% open
4	76-100% open

8. Volume of solution taken up. This was obtained by measuring the final volume of the solution per treatment at the termination of the postharvest life of the cutflower samples and deducted from the initial volume of 300 ml.

9. Maximum flower diameter attained (cm). This was obtained by measuring the maximum flower attained after the termination of the study.

10. Documentation. This was taken through pictures. Figure 1 shows the overview of the experiment during setting- up while Figures 2 to 4 show documentation of the whole study.

Figure 1. Overview of the experiment during setting-up

Figure 2. *Zanthedeschia aethiopiea* at the termination

Figure 3. *Zanthedeschia elliotiana* at the termination

Figure 4. Overview of the experiment at the termination of the observation

RESULTS AND DISCUSSION

Vaselife (Days)

Effect of variety. Statistical analysis did not show any significant differences on the effect of the different holding solutions on the vaselife of calla lily cutflowers. Results show that cutflowers of *Zanthedeschia aethiopiea* had the longest aesthetic value with 15.10 days compared to *Zanthedeschia elliotiana* which had the shortest vaselife with a mean of 14.90 days only. It was observed also that the *Zanthedeschia elliotiana* has a longer vaselife compared to *Zanthedeschia aethiopiea* as shown in Figure 2 and Figure 3.

Effect of holding solutions. Statistical analysis shows that there is significant differences on the effect of the different holding solutions on the vaselife of cut calla lily flowers held in control or the distilled water only had the longest of vaselife with a mean

Table 1. Vaselife

TREATMENT	VASELIFE (days)
Variety	
Zanthedeschia aethiopiea (white)	15.10[a]
Zanthedeschia elliotiana (green)	14.90[a]
Holding Solution	
Distilled water only	18.00[a]
20% sucrose + 5 ml chlorox/ li water	14.00[b]
20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water	14.75[b]
50% uncola pop drink (sprite) + 5 ml chlorox/ li water	14.25[b]
150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water	14.00[b]

Means with same letter are not significantly different at 5% level of DMRT.

of 18.00 days followed by cutflowers held in 20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water with a mean of 14.75. Cutflowers held in20% sucrose + 5 ml chlorox/ li water and 150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water had the lowest vaselife with a mean of 14.00 days from holding.

Interaction effect- It did not show significant differences observed between the two varieties of calla lily cutflowers and the different holding solutions on the vaselife of calla lily cutflowers. Findings showed that using the distilled water only was the best holding solution in prolonging the vaselife of calla lily with a mean of 18.00 days.

Initial pH of the Holding Solutions

Effect of variety. The initial pH of the holding solutions containing distilled water only were more alkaline in contrast to other holding solutions which had initial pH that ranged from 6.5 to 6.8.

Effect of holding solutions. Results show that there were no significant differences obtained on the initial pH among the treatments. Calla lily held in distilled water only had the highest initial pH among the treatments with a mean of 7.0 while cutflowers held in 50% uncola pop drink (sprite) + 5 ml chlorox/ li water had the lowest pH of 6.5.

Interaction effect. Statistical analysis shows that there were no significant interaction effects noted between the two varieties calla lily and the holding solutions with regards to the initial pH of the holding solutions. Results showed that cutflowers held in distilled water only had the highest initial pH reading of 7.0.

Final pH of the Holding Solution

Effect of variety. Statistical analysis showed significant differences on the final pH of the holding solution with regards to the final pH of the holding solution.

Effect of holding solution. It did not show significant differences with regards to the different holding solutions. Based from the results, there was a decrease in pH of the holding solutions which became more acidic ranging from 6.25 to 6.66 but were more effective in prolonging the postharvest life of the cutflowers.

Interaction effect. Statistical analysis shows that there were no significant interaction effects noted between the two varieties and the different holding solutions with regards to the final pH of the holding solution. Results showed that cutflowers held in distilled water only had the highest final pH reading of 6.8.

Table 2. Initial and final pH of the holding solutions

TREATMENT	INITIAL pH	FINAL pH
Variety		
Zanthedeschia aethiopiea (white)		6.42[a]
Zanthedeschia elliotiana (green)		6.61[a]
Holding Solution		
Distilled water only	7.0	6.25[a]
20% sucrose + 5 ml chlorox/ li water	6.8	6.66[a]
20% sucrose + 25% uncola pop drink (sprite) + ml chlorox/ li water	6.8	6.58[a]
50% uncola pop drink (sprite) + 5 ml chlorox/ li water	6.5	6.45[a]
150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water	6.8	6.63[a]

Means with same letter are not significantly different at 5% level of DMRT.

Stem Quality

Effect of variety. It shows that there were no significant differences obtained on the stem quality rating. Results show that *Zanthedeschia aethiopiea* variety exhibited the best stem quality with a mean of 2.40 compared to *Zanthedeschia elliotiana* with a mean of 2.20.

On the 4th day, there were no significant differences obtained on the stem quality. On the 8th day, still it did not show significant differences; however cutflowers held in 50% uncola pop drink (sprite) + 5 ml chlorox/ li water had the highest percentage of stem browning and rotting with a mean of 3.50 of compared to those held in distilled water only which had the highest stem quality rating with a mean of 1.00. On the 12th day to 16th day, there were no significant differences obtained on the stem quality of the calla lily cutflowers. Stem quality rating ranged from 1 to 3.50.

Effect of holding solution. There were no significant differences obtained on the 4th day with regards to the stem quality rating of calla lily cutflowers as affected by the different holding solution used.

On the 8th day, calla lily cutflowers held in 50% uncola pop drink (sprite) + 5 ml chlorox/ li water had the highest stem quality rating of 3.50 showing the highest percentage of stem browning and rotting while calla lily cutflowers held in distilled water only or the control had the lowest percentage of stem browning/ rotting at the base. Furthermore, on the 12th day, it was observed that there were significant differences obtained on the stem quality. Cutflowers held in 50% uncola pop drink (sprite) + 5 ml chlorox/ li water still had the highest percentage of stem browning and rotting with a mean of 3.50 while the lowest percentage of stem browning and rotting was obtained by

Table 3. Stem quality rating

TREATMENT		STEM QUALITY RATING (days) 4th	8th	12th	16th
Variety					
Zanthedeschia aethiopiea (white)	1	2.40[a]	2.40[a]	2.80[a]	
Zanthedeschia elliotiana (green)	1	2.20[a]	2.45[a]	2.80[a]	
Holding Solution					
Distilled water only	1	1.00[c]	1.00[a]	1.00[c]	
20% sucrose + 5 ml chlorox/ li water	1	2.00[b]	2.25[a]	3.25[ab]	
20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water	1	2.62[b]	2.87[ab]	3.25[ab]	
50% uncola pop drink (sprite) + 5 ml chlorox/ li water	1	3.50[a]	3.50[a]	3.62[b]	
150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water	1	2.37[b]	2.50[b]	2.87[b]	

Means with same letter are not significantly different at 5% level of DMRT.

those cutflower held in distilled water only or the control. On the 16th day, it shows significant differences on the stem quality rating. Cutflowers held in 50% uncola pop drink (sprite) + 5 ml chlorox/ li water attained the highest percentage of stem browning and rotting of 3.62 mean while calla lily cutflowers held in distilled water only or the control promote or displayed the best stem quality.

Interaction effect. Statistical analysis shows that there were no significant differences between the two varieties of calla lily cutflowers and the different holding solutions on the stem quality rating obtained.

Temperature

Calla lily cutflowers were held for 18 days in the Floriculture Room for observations. Room temperature was gathered daily from holding in the different

solutions to the termination of the study. The daily temperature of the holding room (Table 4) was recorded every 10 o'clock in the morning and 2 o'clock in the afternoon

Table 4. Daily temperature

DATE	TEMPERATURE (°C)	
	10:00 AM	2:00 PM
March 6, 2010	25	24
March 7, 2010	22	24
March 8, 2010	23	24
March 9, 2010	23	25
March10, 2010	25	25
March 11, 2010	24	23
March 12, 2010	23	24
March 13, 2010	22	23
March 14, 2010	24	25
March 15, 2010	25	24
March 16, 2010	24	25
March 17, 2010	25	24
March 18, 2010	24	22
March 19, 2010	25	23
March 20, 2010	23	24
March 21, 2010	24	25
March 22, 2010	25	26
March 23, 2010	23	24

solutions to the termination of the study. The daily temperature of the holding room everyday. Observations shows that there were no drastic fluctuations in the temperature of the holding room, which ranged from 22 to 25 °C minimum and from 22 to 26 °C maximum temperature.

Number of Days from Immersion of
the Stems Ends to Full Flower Opening

Effect of variety. It shows that there were no significant differences obtained on the two varieties on the number of days from immersion of the stem ends to full flower opening. *Zanthedeschia elliotiana* variety opened faster with a mean of 11.40 days while

Table 5. Number of days from immersion of the stem ends to full flower opening

TREATMENT	NUMBER OF DAYS FROM IMMERSION
Variety	
Zanthedeschia aethiopiea (white)	9.20[a]
Zanthedeschia elliotiana (green)	11.40[a]
Holding Solution	
Distilled water only	11.00[a]
20% sucrose + 5 ml chlorox/ li water	9.75[a]
20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water	10.12[a]
50% uncola pop drink (sprite) + 5 ml chlorox/ li water	9.37[a]
150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water	11.25[a]

Means with same letter are not significantly different at 5% level of DMRT.

Zanthedeschia aethiopiea variety had the longest duration of flower opening with 9.20 days (Table 5).

Effect of holding solutions. Table 5 shows that there were no significant differences obtained on the number of days from immersion of the stem ends in the different holding solutions to full flower opening. However, cut calla lily flowers held in 150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/li water has the longest duration to open with a mean of 11.25 days followed by calla lily cutflowers held in distilled water only with a mean of 11.00 while holding solutions containing 50% uncola pop drink (sprite) + 5 ml chlorox/ li water has the shortest duration to flower opening with a mean of 9.37 days.

Interaction effect. The interaction effects on the number of days from immersion of the stem ends to full flower opening as affected by the two varieties and the different holding solutions were not significant.

Number of Days from Full Flower
Opening to the Onset of Senescence

Effect of variety. Table 6 shows that there were significant differences obtained between the two varieties. *Zanthedeschia aethiopiea* cutflowers showed onset of senescence after 8.80 days while *Zanthedeschia elliotiana* earlier signs of senescence after a mean of 6.60 days.

Effect of holding solutions. Results shows that there were no significant differences among the different holding solutions, with regards to the number of days from full flower opening to the onset of senescence cutflowers held in distilled water only with a mean of 11.00 while holding solutions containing 50% uncola pop drink (sprite) + 5 ml chlorox/ li water has the longest duration to flower opening with a mean of 9.37.

Interaction effect. The interaction effects on the number of days from immersion

Table 6. Number of days from full flower opening to the onset of senescence

TREATMENT	DAYS FROM FULL FLOWER OPENING
Variety	
Zanthedeschia aethiopiea (white)	8.00[a]
Zanthedeschia elliotiana (green)	6.60[b]
Holding Solution	
Distilled water only	7.62[a]
20% sucrose + 5 ml chlorox/ li water	8.25[a]
20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water	7.37[a]
50% uncola pop drink (sprite) + 5 ml chlorox/ li water	8.62[a]
150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water	6.62[a]

Means with same letter are not significantly different at 5% level of DMRT.

of the stem ends to full flower opening as affected by the two varieties and the different holding solutions were not significant.

Flower Opening Index

Effect of variety. Statistical analysis that there were no significant differences obtained on the effect of two varieties as affected by flower opening index. Results shows that on the 4th and 8th day had no significant differences observed. However on the 12th day, significant differences observed on the flower opening index, *Zanthedeschia elliotiana* attained 3.55 mean while *Zanthedeschia aethiopiea* variety has 3.10 mean. On the 16th day, it shows that there were no significant differences on the flower opening index of the two varieties. Figure 1 shows the calla lily in its 25% anthesis while the Figure 4 shows its 100% anthesis until its termination.

Effect of holding solution. There were no significant differences on the 4th day until 16th day obtained on the flower opening index as affected by the different holding solution as shown in Table 7.

Table 7. Flower opening index

TREATMENT	FLOWER OPENING INDEX 4th	8th	12th	16th
Variety				
Zanthedeschia aethiopiea (white)	1	2.45[a]	3.10[b]	3.75[a]
Zanthedeschia elliotiana (green)	1	2.75[a]	3.55[a]	3.85[a]
Holding Solution				
Distilled water only	1	2.37[a]	3.25[a]	3.87[a]
20% sucrose + 5 ml chlorox/ li water	1	2.37[a]	3.12[a]	3.75[a]
20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water	1	3.12[a]	3.50[a]	4.00[a]
50% uncola pop drink (sprite) + 5 ml chlorox/ li water	1	2.62[a]	3.37[a]	3.75[a]
150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water	1	2.50[a]	3.37[a]	3.62[a]

Means with same letter are not significantly different at 5% level of DMRT.

Interaction effect. There were no significant interaction effects noted between the two varieties and the different holding solutions with regards to flower opening index.

Volume of Solution Taken Up

Effect of variety. It was observed that the two varieties had significant differences effect on the volume solution taken up measured after the termination of observations on the 12th day. *Zanthedeschia elliotiana* variety had higher rate of solution uptake with a mean of 63.55 compared to *Zanthedeschia aethiopiea* variety with a mean of 55.85.

Effect of holding solution. Statistical analysis showed that there were no significant differences in the volume of holding solution taken up by the calla lily cutflowers as affected by the different holding solutions. However, cutflowers held in control or the distilled water only the had higher rate of absorption taking up 62.62 ml at

Table 8. Volume of solution taken up

TREATMENT	VOLUME OF SOLUTION (ml)
Variety	
Zanthedeschia aethiopiea (white)	8.00[a]
Zanthedeschia elliotiana (green)	6.60[b]
Holding Solution	
Distilled water only	7.62[a]
20% sucrose + 5 ml chlorox/ li water	8.25[a]
20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water	7.37[a]
50% uncola pop drink (sprite) + 5 ml chlorox/ li water	8.62[a]
150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water	6.62[a]

Means with same letter are not significantly different at 5% level of DMRT.

the termination of observations while cutflowers held in 150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/ li water has the lowest rate of absorption with a mean of 56.60.

Interaction Effect. Statistical analysis that there were no significant interaction effects noted between the two varieties calla lily and the holding solutions with regards to the initial pH of the holding solutions.

Maximum Flower Diameter Attained

Effect of variety. Table 9 shows the observed maximum flower diameter attained. *Zanthedeschia elliotiana* displayed maximum diameter of 10.95 cm and were significantly bigger compared to *Zanthedeschia aethiopiea* with a mean of 9.29 cm.

Effect of holding solution. Statistical analysis shows that there were no significant differences obtained in the maximum flower diameter attained. However, results shows that cutflowers held in 50% uncola pop drink (sprite) + 5 ml chlorox/ li water has the highest mean of 11.17 cm while the cutflowers treated with 20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water has 8.71 cm mean.

Table 9. Maximum flower diameter attained

TREATMENT	FLOWER DIAMETER (cm)
Variety	
Zanthedeschia aethiopiea (white)	9.29[b]
Zanthedeschia elliotiana (green)	10.95[a]
Holding Solution	
Distilled water only	10.28[a]
20% sucrose + 5 ml chlorox/ li water	10.21[a]
20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water	8.71[a]
50% uncola pop drink (sprite) + 5 ml chlorox/ li water	11.17[a]
150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/li water	10.22[a]

Means with same letter are not significantly different at 5% level of DMRT.

Interaction effect. Statistical analysis shows that there were no significant differences obtained in the varieties and the different holding solutions used.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The newly harvested calla lily cutflowers were obtained from the florist in Baguio City at 25% anthesis, the stem ends were cut about 3-4 cm at the basal ends and slim were soaked for one night in tap water only before holding them in the different holding solutions stem length at about 45 cm. They were held at different holding solutions with different levels of sucrose, ascorbic acid, uncola pop drink (sprite) concentrations. Results shows that calla lily cutflowers *Zanthedeschia aethiopiea* held in distilled water had longer postharvest life.

Zanthedeschia elliotiana variety and were held in 20% sucrose + 5 ml chlorox/ li water had the highest pH of the holding solution. With regards to number of days to full flower opening it was observed that *Zanthedeschia elliotiana* variety held in 150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/li water enhance faster duration to open. In terms of flower quality rating *Zanthedeschia aethiopiea* held in 150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/li water had the lowest flower quality rating compared to *Zanthedeschia elliotiana* in the different holding solutions. However cutflowers held in 20% sucrose + 25% uncola pop drink (sprite) + 5 ml chlorox/ li water enhance flower opening compared to control. The number of days from full opening to onset of senescence observed in cutflowers held in 50% uncola pop drink (sprite) + 5 ml chlorox/ li water enhance onset of senescence while 150 ppm ascorbic acid + 8% sucrose + 1ml chlorox/li water delay senescence. On the variety *Zanthedeschia aethiopiea* attained the highest percentage of senescence.

The volume of solution taken up was higher on *Zanthedeschia elliotiana* variety with a mean of 63.65. With regards to the effect of different holding solutions, distilled water promoted higher solution absorption compared to the other treatments. Highest stem quality were recorded in cutflowers *Zanthedeschia elliotiana* variety held in distilled water only while 20% sucrose + 5 ml chlorox/ li water had the lowest quality showing the highest percentage of stem browning and rotting. The two varieties have the same stem quality rating. Distilled water only exhibited the best stem quality. However, the widest flower diameter was attained in calla lily cutflowers held in 50% uncola pop drink (sprite) + 5 ml chlorox/ li water while *Zanthedeschia elliotiana* displayed the widest flower diameter.

Conclusions

Results show that distilled water only is the best for calla lily cutflowers for longer vaselife and displayed good stem quality.

Recommendations

Based on the findings, it is recommended to use distilled water only in prolonging the vaselife of calla lily cutflowers and maintain or promote the best stem quality.

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APPENDICES

Appendix Table 1. Vaselife (days)

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	18	18	18	18	72	18.00
T2	14	15	13	14	56	14.00
T3	13	15	16	15	59	14.75
T4	12	14	17	16	59	14.75
T5	14	14	14	14	56	14.00
V2T1	18	18	18	18	72	18.00
T2	16	14	13	13	56	14.00
T3	14	16	15	14	60	15.00
T4	13	15	13	14	55	13.75
T5	13	15	15	13	56	14.00

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	0.40	0.40	0.32ns	4.17	7.56
Factor B	4	93.00	23.25	18.85**	2.69	4.02
AB	4	1.60	0.40	0.32ns	2.69	4.02
Error	30	37.00	1.23			
TOTAL	39	132.00				

ns = not significant; **= highly significant Coefficient of variation = 7.40 %

Appendix Table 2. Final ph of holding solution

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	6.7	4.6	6.8	6.5	24.60	6.15
T2	6.6	6.6	6.7	6.6	26.50	6.62
T3	6.6	6.2	6.6	6.6	26.00	6.50
T4	6.5	5.8	6.2	6.5	25.00	6.25
T5	6.8	6.7	6.4	6.4	26.30	6.57
V2T1	6.3	6.6	6.1	6.4	25.40	6.35
T2	6.6	6.8	6.8	6.6	26.80	6.70
T3	6.6	6.7	6.6	6.8	26.70	6.65
T4	6.6	6.8	6.6	6.6	26.60	6.65
T5	6.6	6.6	6.8	6.6	26.80	6.70

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	0.40	0.40	0.32ns	4.17	7.56
Factor B	4	93.00	23.25	18.85**	2.69	4.02
AB	4	1.60	0.40	0.32ns	2.69	4.02
Error	30	37.00	1.23			
TOTAL	39	132.00				

ns = not significant; **= highly significant Coefficient of variation = 5.67 %

Appendix Table 3. Stem quality rating (day 8)

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	1	1	1	1	4	1.00
T2	2	2	2	2	8	2.00
T3	2	4	3	3	12	3.00
T4	3	4	3	4	14	3.50
T5	3	2	3	2	10	2.50
V2T1	1	1	1	1	4	1.00
T2	2	2	2	2	8	2.00
T3	2	2	3	3	9	2.25
T4	2	4	4	4	14	3.50
T5	1	2	2	4	9	2.25

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	0.40	0.40	0.96ns	4.17	7.56
Factor B	4	26.65	6.66	15.99**	2.69	4.02
AB	4	0.85	0.21	0.51ns	2.69	4.02
Error	30	12.50	0.41			
TOTAL	39	40.40				

ns = not significant; **= highly significant Coefficient of variation = 28.07 %

Appendix Table 4. Stem quality rating (day 12)

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	1	1	1	1	4	1.00
T2	3	2	2	2	9	2.25
T3	2	4	3	3	12	3.00
T4	3	4	4	2	13	3.25
T5	3	2	3	2	10	2.50
V2T1	1	1	1	1	4	1.00
T2	2	2	3	2	9	2.25
T3	4	2	3	2	11	2.75
T4	4	4	3	4	15	3.75
T5	2	2	2	4	10	2. 50

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	0.02	0.02	0.05ns	4.17	7.56
Factor B	4	27.40	6.85	14.94**	2.69	4.02
AB	4	0.60	0.15	0.33ns	2.69	4.02
Error	30	13.75	0.15			
TOTAL	39	41.77				

ns = not significant; **= highly significant Coefficient of variation = 27.92%

Appendix Table 5. Stem quality rating (day 16)

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	1	1	1	1	4	1.00
T2	4	3	3	3	13	3.25
T3	3	4	3	3	13	3.25
T4	3	4	4	3	14	3. 50
T5	3	3	3	3	9	2.25
V2T1	1	1	1	1	4	1.00
T2	3	3	4	3	13	3.25
T3	4	2	4	3	13	3.25
T4	4	4	4	3	15	3.75
T5	2	2	3	4	11	2. 75

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	0.00	0.00	0.00ns	4.17	7.56
Factor B	4	34.65	8.66	27.35**	2.69	4.02
AB	4	0.25	0.06	0.20ns	2.69	4.02
Error	30	9.50	0.31			
TOTAL	39	44.40				

ns = not significant; **= highly significant Coefficient of variation = 20.10 %

Appendix Table 6. Number of days from immersion of the stem ends to full flower opening

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	10	9	9	8	36	9.00
T2	8	7	8	8	31	7.75
T3	10	10	9	11	40	10.00
T4	8	8	9	9	33	8.25
T5	12	10	10	11	33	8.25
V2T1	14	12	12	14	52	13.00
T2	12	14	13	8	47	11.25
T3	8	7	13	13	41	10.25
T4	15	9	9	8	15	10.25
T5	14	9	13	11	47	11.25

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	48.40	48.40	13.26**	4.17	7.56
Factor B	4	20.65	5.16	1.41ns	2.69	4.02
AB	4	23.85	5.96	1.61ns	2.69	4.02
Error	30	109.50	3.65			
TOTAL	39	202.400				

ns = not significant; **= highly significant Coefficient of variation = 18.55%

Appendix Table 7. Number of days from full flower opening to the onset of senescence

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	8	9	9	10	36	9.00
T2	10	11	10	10	41	10.25
T3	8	8	9	7	32	8.00
T4	10	10	9	9	38	9.50
T5	6	8	8	7	29	7.25
V2T1	4	6	6	4	20	5.00
T2	6	3	5	10	25	6.25
T3	10	7	5	5	27	6.75
T4	3	9	9	10	31	7.75
T5	4	8	5	7	24	6.00

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	48.40	48.40	14.59**	4.17	7.56
Factor B	4	19.40	4.85	1.46ns	2.69	4.02
AB	4	11.10	2.77	0.84ns	2.69	4.02
Error	30	99.50	3.31			
TOTAL	39	178.400				

ns = not significant; **= highly significant Coefficient of variation = 23.65 %

Appendix Table 8. Flower opening index (day 8)

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	2	3	3	2	10	2.50
T2	2	2	2	2	8	2.00
T3	4	2	3	3	12	3.00
T4	2	2	3	2	9	2.25
T5	2	3	3	2	10	2.50
V2T1	2	2	3	2	9	2.25
T2	2	2	3	4	11	2.75
T3	4	4	3	2	13	3.25
T4	2	3	4	3	12	3.00
T5	2	3	3	3	10	2.50

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	0.90	0.90	1.93ns	4.17	7.56
Factor B	4	3.10	0.77	1.66ns	2.69	4.02
AB	4	1.60	0.40	0.86ns	2.69	4.02
Error	30	14.00	0.46			
TOTAL	39	178.400				

ns = not significant Coefficient of variation = 26.27 %

Appendix Table 9. Flower opening index (day 12)

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	3	3	2	3	11	2.75
T2	4	3	3	2	12	3.00
T3	3	4	3	3	13	3.25
T4	4	3	3	3	13	3.25
T5	3	3	3	4	13	3.25
V2T1	4	4	4	3	15	3.75
T2	3	2	4	4	13	3.25
T3	4	4	3	4	15	3.75
T4	3	3	4	4	14	3.50
T5	3	4	3	4	14	3.50

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	2.02	2.02	5.40*	4.17	7.56
Factor B	4	0.65	0.16	0.43ns	2.69	4.02
AB	4	0.85	0.21	0.57ns	2.69	4.02
Error	30	11.25	0.37			
TOTAL	39	14.775				

ns = not significant; *= highly significant Coefficient of variation = 18.82 %

Appendix Table 10. Flower opening index (day 16)

TREATMENT	REPLICATION				TOTAL	MEAN
	I	II	III	IV		
VIT1	4	4	3	4	15	3.75
T2	4	4	4	3	15	3.75
T3	4	4	4	4	16	4.00
T4	4	3	4	4	15	3.75
T5	3	3	4	4	14	3. 50
V2T1	4	4	4	4	16	4.00
T2	4	3	4	4	15	3.75
T3	4	4	4	4	16	4.00
T4	3	4	4	4	15	3.75
T5	4	4	3	4	15	3.75

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	0.10	0.10	0.55	4.17	7.56
Factor B	4	0.65	0.16	0.89ns	2.69	4.02
AB	4	0.15	0.03	0.20ns	2.69	4.02
Error	30	5.50	0.18			
TOTAL	39	6.400				

ns = not significant Coefficient of variation = 11.27 %

Appendix Table 11. Volume of solution taken up

TREATMENT	REPLICATION				TOTAL	MEAN (ml)
	I	II	III	IV		
VIT1	64	40	64	52	220	55.00
T2	55	67	54	58	234	58.50
T3	57	56	60	54	227	56.75
T4	54	56	60	58	228	57.00
T5	58	52	56	42	208	52.00
V2T1	86	67	66	62	281	70.25
T2	66	40	54	68	228	57.00
T3	64	78	72	54	268	67.00
T4	68	64	60	60	252	63.00
T5	53	77	56	58	244	61.00

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	608.40	608.40	8.08**	4.17	7.56
Factor B	4	219.25	54.81	0.73ns	2.69	4.02
AB	4	305.35	76.33	1.01ns	2.69	4.02
Error	30	2258.50	75.28			
TOTAL	39	3391.50				

ns = not significant; **= highly significant Coefficient of variation = 14.52 %

Appendix Table 12. Maximum flower diameter attained

TREATMENT	REPLICATION				TOTAL	MEAN (cm)
	I	II	III	IV		
VIT1	8.2	9.5	8	7.5	33.20	8.30
T2	10	9.2	8.5	9	36.70	9.17
T3	9	8	6.6	8.5	32.10	8.02
T4	13.6	12	11	7.8	44.40	11.10
T5	10	12.5	8	9	39.50	9.87
V2T1	13.6	14	10.5	11	49.10	12.27
T2	14	7.5	13.5	10	45.00	11.25
T3	7	6	12.6	12	37.60	9.4
T4	8.4	14	12	10.6	45.00	11.25
T5	13.5	7.4	10.4	11	42.30	10.57

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Factor A	1	27.39	27.39	5.73*	4.17	7.56
Factor B	4	25.13	6.28	1.32ns	2.69	4.02
AB	4	17.62	4.40	0.92ns	2.69	4.02
Error	30	143.29	4.47			
TOTAL	39	213.45				

ns = not significant; **= highly significant Coefficient of variation = 21.59 %