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Vase Life Studies on Cut Foliages under Shevaroy Condition of Eastern Ghats

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A B S T R A C T

Post-harvest studies were attempted using pulsing and simulated transportation on vase life of 29 ornamental cut foliages under Shevaroy hills at Horticultural Research Station, Yercaud. Holding solution containing Sucrose 5% + $AgNO_3$ 50 ppm significantly increased vase life of *Dracaena fragrans* 'Massangeana', *Heliconia rostrata, Philodendron red emerald* and *Dracaena fragrans 'lemon lime'*. Pulsing solution containing Sucrose 5%+ $AgNO_3$100 ppm significantly increased vase life of *Cordyline chocolate queen*, *Nephrolepis cordifolia*, *Cordyline terminalis* and *Cordylne compacta*. The study also revealed that vase life durations ranged from 6.00 to 15.00 days.

Introduction

Cut greens are an important component of the floricultural industry, largely used for decoration as filler in floral compositions. They provide freshness and colour variety to arrangements and bouquets (Pacifici *et al.*, 2007). Foliage plants include all plants grown for their attractive leaves rather than for flowers and fruits. In general horticultural terms, however plants are those with attractive foliage and flowers that are able to survive and grown indoors. Foliage plants, in common terminology, are called house plants. The cut foliage industry in Florida started in the 1980s when growers started producing *Asparagus* sp for shipment to northern markets (Manning, 1984). Nowadays, cut flowers and foliage occupy an important position in the local and foreign markets, due to its importance as a source of national income.

There are suitable environmental conditions for the production of flower and foliage crops for domestic and export market. Cut foliage production has been increasing rapidly in recent years. Flowers and foliage plants are

some of the most colourful and attractive horticultural plants. Some are used to decorate the rooms while others are used to beautify the areas around our homes and public building. The preservatives materials used as pulsing and holding solutions seemed to prolong longevity. In this study, some chemical preservatives *i.e.,* citric acid or aluminum sulphate as a biocide alone on with sucrose were used to prolong vase life (Chen *et al.,* 2004).

Materials and Methods

The present investigation was carried out at Horticultural Research Station, Tamil Nadu Agricultural University, Yercaud during 2012- 2014. The experimental site is situated between 11° 04" to 11° 05" North latitude and 78° 05" to 78° 23" East longitude and at an altitude of 1500 m above Mean Sea Level.

The average minimum and maximum temperature of the area were 12.4^{o}C and31.0^{o}C respectively. The soil is laterite in texture with 0.5 to 1.5 m depth. The experiment was laid out in a Randomized Block Design with three replication. Planting of twenty nine cut foilages was made in 44× 21 m with plant spacing 1 × 0.8 cm. Data was generated on vegetative characters at 30 day intervals. Vegetative characters like plant height, number of shoots, number of leaves, length of leaves, width of leaves, plant spread, stem girth and post harvest characters like Pulsing solutions, Holding solutions and packing studies.

The details of the treatments used are given below:

Pulsing treatments

P_o – Filtered Water
P_1- Acidified Water (pH 3.5)
P_2- Sucrose 5%
P_3- Sucrose 5%+ $AgNO_3$ 50ppm
P_5- Sucrose 5%+ $AgNO_3$100ppm

Holding treatments

H_o – Filtered Water
H_1- Acidified Water (pH 3.5)
H_2- Sucrose 5%
H_3- Sucrose 5%+ $AgNO_3$ 25ppm
H_4- Sucrose 5%+ $AgNO_3$ 50ppm

Packaging studies

The foliage of different species were treated with the best pulsing solution and packed (both dry without any cotton plug and with a cotton plug at the petiole end) in cartons of 60×30×10 cm in bunches of twelve/carton.

The following lining materials were used along with control:

Print sheet
Polythene sheet
Polypropylene sheet

The data generated during the course of study was subjected to statistical analysis as prescribed by Panse and Sukhatme (2000).

Results and Discussion

Among the different holding solutions used, higher vase life was recorded in H_4 (Sucrose 5% + $AgNO_3$ 50 ppm) with 16.3 days. This was significantly superior to other holding treatments. Cut foliage treated with Sucrose 5%, Sucrose 5%+ $AgNO_3$ 25 ppm treatment also showed a relatively longer vase life (15.9 days) (Table 1). Foresst (1991) also reported that pulsing cut *Eucalyptus gunni* with STS or 8 HQC did not lengthen the vase life. According to postharvest treatments for codiaeum cut stems showed highest vase life in 8-HQS and had no significant differences for preservatives and tap water. 8-HQS

controlled microbial growth in the holding solution and helped to prolong vase life of cut stems (Hettiarachchi and Balas, 2005). The enhancement of vase life of cut foliages by using sucrose in combination with $AgNO_3$ @ 20 and 40 ppm reported by Malakar *et al.*, 2017. Wijayabandara *et al.,* 2018 reported that the most effective vase solutions for *Ophiopogon japonicus* were sucrose 20 or 30 g/L pulsing treatments for 24 hour.

Table.1 Effect of the holding solution on the cut foliages at Shevaroy condition

Name of the species	H_0	H_1	H_2	H_3	H_4	Mean
Dracaena reflexa	7.00	7.50	8.60	15.1	14.7	10.60
Cordyline tango	7.00	7.50	12.2	13.4	13.7	10.70
Dracaena sanderiana	6.50	7.20	12.6	14.5	16.1	11.40
Dracaena compacta	6.20	6.30	11.7	14.1	15.7	10.80
***Dracaena reflexa'* Song of Jamaica'**	7.20	5.60	10.3	15.9	16.3	11.00
***Dracaena fragrans* 'Massangeana'**	8.40	7.30	11.5	15.0	15.5	11.50
***Dracaena '* Purple compacta'**	7.10	6.10	11.5	12.9	12.9	10.10
Dracaena marginata	5.20	5.40	10.4	14.5	15.2	10.10
Cordyline fruitcosa	7.20	7.50	10.9	13.3	14.5	10.70
Philodendron xanadu	7.90	6.40	11.9	12.9	14.4	10.70
Philodendron red emerald	7.70	6.70	11.7	13.1	16.2	11.10
Anthurium andreanum	6.40	6.50	11.3	15.0	15.5	10.90
Dracaena fragrans 'lemon lime'	7.10	6.20	11.2	12.4	16.2	10.60
Aglaonema Crispum	8.40	6.70	10.7	14.0	13.6	10.70
Cordylne compacta	7.00	7.00	11.6	13.5	15.3	10.90
Cordyline negra	6.40	6.60	11.4	12.3	14.1	10.20
Cordyline terminalis	7.30	6.20	9.90	13.3	14.5	10.30
Dracaena reflexa var tropical	6.50	6.60	11.3	13.6	14.5	10.50
Cordyline chocolate swirl	6.90	5.70	13.4	14.7	15.2	11.20
Cordyline chocolate queen	7.40	7.50	12.5	12.9	13.7	10.80
Nephrolepis cordifolia	7.80	6.50	10.1	12.1	14.4	10.20
Nephrolepis falcate	7.60	6.90	12.2	14.3	15.3	11.30
Philodendron green emerald	7.70	6.00	12.1	14.1	15.4	11.10
Philodendron 'ceylone gold'	6.50	5.90	11.9	10.0	13.4	9.50
Philodendron imbe 'variegata'	6.30	6.80	11.4	15.3	15.1	11.00
Heliconia rostrata	7.40	6.00	11.3	13.7	16.3	10.90
Asparagus sprengeri	6.70	7.20	11.5	15.3	15.3	11.20
Asparagus setaceous	7.3	5.8	11.3	13.6	15.5	10.70
Asparagus densiflorus	5.7	6.4	10.0	12.7	14.1	9.80
SEd	0.40	0.36	0.70	1.10	0.74	-
CD (P= 0.05)	0.81	0.72	1.40	2.21	1.49	

*H_o – Filtered Water H_1- Acidified Water (pH 3.5)
H_2- Sucrose 5% H_3- Sucrose 5%+ $AgNO_3$ 25ppm
H_4- Sucrose 5%+ $AgNO_3$ 50ppm

Table.2 Effect of pulsing treatments on the cut foliage at Shevaroy condition

Name of the species	P_0	P_1	P_2	P_3	P_4	Mean
Dracaena reflexa	12.90	9.80	10.20	10.90	17.10	12.20
Cordyline tango	10.40	10.50	11.50	10.80	18.30	12.30
Dracaena sanderiana	9.10	9.00	9.70	9.20	19.70	11.30
Dracaena compacta	9.60	9.80	9.60	9.70	16.80	11.10
***Dracaena reflexa'* Song of Jamaica'**	9.10	8.90	9.40	9.10	17.90	10.90
***Dracaena fragrans* 'Massangeana'**	10.4	9.00	12.90	10.80	19.00	12.40
***Dracaena '* Purple compacta'**	9.20	10.10	10.60	10.00	20.60	12.10
Dracaena marginata	8.10	9.90	12.00	10.00	20.10	12.00
Cordyline fruitcosa	8.60	8.20	9.10	8.70	19.70	10.90
Philodendron xanadu	8.00	8.20	10.10	8.70	20.00	11.00
Philodendron red emerald	9.20	8.90	11.30	9.80	17.90	11.40
Anthurium andreanum	10.50	10.10	11.80	10.80	17.40	12.10
Dracaena fragrans 'lemon lime'	9.30	11.70	12.70	11.20	16.50	12.30
Aglaonema Crispum	8.40	10.10	12.30	10.30	15.80	11.40
Cordylne compacta	8.50	10.40	10.10	9.70	19.50	11.60
Cordyline negra	8.30	9.50	10.60	9.50	18.50	11.30
Cordyline terminalis	8.30	9.50	10.80	9.50	19.40	11.50
Dracaena reflexa var tropical	8.50	8.20	9.50	8.70	18.40	10.70
Cordyline chocolate swirl	7.80	8.30	10.30	8.80	17.10	10.40
Cordyline chocolate queen	8.70	10.40	11.80	10.30	20.30	12.30
Nephrolepis cordifolia	8.90	8.90	11.20	9.70	19.30	11.60
Nephrolepis falcate	8.80	8.30	10.50	9.20	17.10	10.80
Philodendron green emerald	8.20	7.80	10.30	8.80	19.60	10.90
Philodendron 'ceylone gold'	7.40	8.30	10.80	8.80	17.00	10.40
Philodendron imbe 'variegata'	7.70	8.20	11.30	9.10	17.50	10.70
Heliconia rostrata	7.90	8.10	13.30	9.80	19.90	11.80
Asparagus sprengeri	7.60	8.50	10.50	8.90	17.50	10.60
Asparagus setaceous	8.00	9.20	12.30	9.90	17.90	11.50
Asparagus densiflorus	7.50	7.90	9.50	8.30	18.60	10.30
SEd	**0.48**	**0.55**	**0.61**	**0.88**	**0.74**	-
CD (P= 0.05)	**0.97**	**1.11**	**1.23**	**1.77**	**1.49**	-

P_o – Filtered Water P_1- Acidified Water (pH 3.5)
P_2- Sucrose 5% P_3- Sucrose 5%+ $AgNO_3$ 50ppm
P_4- Sucrose 5%+ $AgNO_3$100ppm

Table.3 Effect of packing / lining materials on cut foliages at Shevaroy condition

Name of the species	Print Sheet	Polythene Sheet	Polypro-line sheet	Mean
Dracaena reflexa	4.50	7.00	7.90	6.40
Cordyline tango	4.50	6.70	8.00	6.40
Dracaena sanderiana	6.50	6.90	8.10	7.10
Dracaena compacta	6.40	7.80	8.40	7.50
***Dracaena reflexa'* Song of Jamaica'**	6.20	7.10	9.00	7.40
***Dracaena fragrans* 'Massangeana'**	13.60	16.50	16.60	15.60
***Dracaena '* Purple compacta'**	5.90	7.40	9.30	7.50
Dracaena marginata	11.30	12.10	14.20	12.60
Cordyline fruitcosa	11.40	12.00	12.40	11.90
Philodendron xanadu	10.70	12.00	12.90	11.80
Philodendron red emerald	11.10	11.10	13.10	11.80
Anthurium andreanum	9.30	9.80	10.90	10.00
Dracaena fragrans 'lemon lime'	6.90	8.50	10.90	8.80
Aglaonema Crispum	13.50	14.30	15.10	14.30
Cordylne compacta	10.30	11.00	12.30	11.20
Cordyline negra	10.90	11.70	13.40	12.00
Cordyline terminalis	11.90	12.30	14.80	13.00
Dracaena reflexa var tropical	8.40	9.90	12.00	10.10
Cordyline chocolate swirl	9.50	11.30	12.30	11.00
Cordyline chocolate queen	9.40	11.10	12.50	11.00
Nephrolepis cordifolia	12.30	12.70	13.50	12.90
Nephrolepis falcate	10.70	11.30	12.60	11.50
Philodendron green emerald	13.80	14.80	13.70	14.10
Philodendron 'ceylone gold'	12.90	13.50	14.80	13.70
Philodendron imbe 'variegata'	11.70	11.90	12.90	12.20
Heliconia rostrata	11.80	13.50	12.40	12.60
Asparagus sprengeri	9.80	10.60	11.30	10.60
Asparagus setaceous	10.60	10.80	11.90	11.10
Asparagus densiflorus	10.10	10.30	12.50	11.00
SEd	**0.58**	**0.58**	**0.63**	
CD (P= 0.05)	**1.16**	**1.16**	**1.26**	

It is evident from Table 2 that significant effect on number of roots was noticed under the treatment P_4 (Sucrose 5% + $AgNO_3$100 ppm) with 20.60 days. This was significantly superior to other pulsing solutions. It was followed by P_2 (Sucrose 5%) with 13.30 days. Nooh *et al.*, (1986) on the other hand reported addition of 8-HQC and Sucrose to the holding solution of *Rusus hypophyllum* and *Nephrolepis exceltata* was more effective than tap water. Criley and Parvin (1993) conducted trails with 21 different cut foliages and found only two genera to be benefited by the use of floral preservatives. In the holding solutions like distilled water and acidified water species

like *Codiaeum varigatum* rooted. Stamps and Osborne (2003) reported rooting of croton leaves in water. They also reported the use of floral preservatives to be determined in the longevity of croton leaves. Elhindi (2012) revealed that in the cut sweet pea (*Lathyrus odoratus* L.) flowers held in the solution containing sucrose + 8-hydroxyquinoline (Suc+HQS) was more effective in promoting absorption rate, achieved greater maximum fresh mass, had better water balance for a longer period, extended the vase life (up to 17 d), and delayed degradation of chlorophylls.

Average vase life for individual harvest ranged from 7.9 d for *Dracaena reflexa* and 8.0 d for *Cordyline tango* to 14.80 d for *Philodendron 'ceylone gold'* and *Cordyline terminalis* (Table 3). *Dracaena reflexa* and *Dracaena sanderiana* frequently had the shortest vase life across all harvests. Packing should protect the cut foliage from any physical damage, water loss and detrimental external conditions during transport. The material used for packing helps to regulate water loss and respiration. Packing the foliage using wet cotton plugs at the petiole end was found to give a better result, which was in conformity with the results of the study, by Nowak and Rudnicki (1990) reported that mature stems of *Asparagus setaceous* and mature leaves of *Dracaena sp*, *Cordyline terminalis* kept well when packed in plastic bags or plugging with wet cotton and packing without lining material was enough to transport the foliage.

In conclusion the increasing vase life is the key issue in the post harvest management of cut foliages. It appears that chemicals used for enhancing vase life, improve the water uptake of cut foliages by reducing the vascular blockage and ultimately improving the vase life. From the results obtained in this experiment, it could be concluded that effect of pulsing treatments and holding treatments (P_5- Sucrose 5% + $AgNO_3$100 ppm and H_4- Sucrose 5% + $AgNO_3$ 50 ppm) could significantly improve the keeping quality of cut foliages.

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