



Evaluation of cut-foilage plants for Eastern Ghats

I. Suryapriya, R. Arulmozhiyan*, A. Sankari¹ and M. Anand¹

Anbil Dharmalingam Agricultural College and Research Institute
Tamil Nadu Agricultural University, Tiruchirappalli- 620 009, India

*E-mail: arulmozhiyan@yahoo.co.in

ABSTRACT

A maiden attempt was made at Horticultural Research Station (HRS), a constituent research unit of Tamil Nadu Agricultural University, located at Yercaud, Salem District, Tamil Nadu, India during 2012-2013 to assess the suitability of various ornamental foliage plant species under Shevroys /Eastern Ghats conditions. Considerable variation was found in quantitative and qualitative parameters among the foliage species. The study recommends *Nephrolepis cordifolia* and *Asparagus sprengeri* as suitable liners, while, large-leaved species like *Cordyline fruticosa* and *Philodendron xanadu* as background materials in larger arrangements, and the smaller-leaved *Dracaena reflexa* var. *angustifolia* for smaller arrangements.

Key words: Foliage plants, arrangements, liner, background material

INTRODUCTION

Cut-foilage industry has made a major breakthrough in floriculture business. Most foliage plants are indigenous to tropical and subtropical regions. In general, foliage plants are grown as understory plants in the canopy of giant trees. As a result, foliage plants are native to this type of environment, are tolerant to low light, sensitive to chilling temperature and are day-neutral to photoperiod. In subtropical climes, temperature as well as humidity may vary with season. Among various parameters, leaf characters assume significance for their use as cut-foilage.

Of the total turnover and supply of floricultural products during 2010 (€4130 million), indoor foliage plants alone contributed €1445 million (Rs. 99.23 billion) in global floricultural trade (Anon., 2011a).

Some of the important indoor foliage plants (genera) occupying world-rank lists in 2010 *Anthurium*, *Kalanchoe*, *Dracaena*, *Ficus*, *Spathiphyllum*, *Hedera*, *Begonia*, *Chrysalidocarpus (lutescens)* and *Zamioculcas*. Recent data showed that floricultural products (live trees and other plants, bulbs, roots and the like; cut-flowers and ornamental foliage) exported from India stood at Rs. 28,645 lakh during the 2010-11 fiscal years. In the same period, imports were valued at Rs. 4,548 lakh (Anon., 2011b). The trend shows that India has been slowly accelerating its pace in the international trade. As for the foliage plant industry, during 2008-2009 more than 39% of the total export from India

was contributed by foliage products, fresh or dry. However, in view of the importance of foliage ornamentals, an experiment was formulated to evaluate 29 foliage species collected from various sources to identify suitable cut-foilage species for the Shevroys region.

MATERIAL AND METHODS

An experiment was conducted using 29 foliage species (Table 1) at Horticultural Research Station, Tamil Nadu Agricultural University, Yercaud, during the year 2012-2013 to evaluate their suitability for foliage. The experimental site is geographically situated between 11° 04" and 11° 05" North Latitude and 78° 05" to 78° 23" East Longitude, at an altitude of 1500m above Mean Sea Level. Average maximum and minimum temperatures during the experimental period were 31.0°C and 12.4°C, respectively. The mean annual rainfall received by Yercaud was 1572mm in 47 rainy days. Average relative humidity was 75%. Irrigation was provided at intervals of 5-6 days throughout the period of experiment, depending upon soil moisture status and weather conditions. All the foliage species were planted at a spacing of 1m × 0.8m. The study was patterned on Randomized Block Design, with three replications. Five plants from each replication were observed for biometrics on plant height (cm), plant spread (cm), leaf length (cm), leaf breadth (cm), number of shoots, leaf area, longevity, petiole length and girth (cm), and internodal length (cm) besides qualitative characters like leaf shape, margin, texture, venation, leaf

¹Horticultural Research Station, TNAU, Ooty, India

apex and foliage colour. Data was compiled, analyzed and is presented in Tables 2 & 3.

Post-harvest treatments like pulsing and holding solution were also studied. In pulsing treatment, mature leaf from each species was harvested and treatments imposed for six hours. Details of the pulsing treatments are as follows: P₀ – Filtered water, P₁- Acidified water (pH 3.5), P₂- Sucrose 5%, P₃- Sucrose 5% + AgNO₃ 50ppm, and, P₄- Sucrose 5% + AgNO₃ 100ppm. After pulsing, the foliage was transferred to water for comparing the effects of treatments. Foliage from different species was subjected to the following holding treatments: H₀ – Filtered water, H₁- Acidified water (pH 3.5), H₂- Sucrose 5%, H₃- Sucrose 5% + AgNO₃ 25ppm and, H₄- Sucrose 5% + AgNO₃ 50ppm. Vase-life was calculated by noting the time taken to develop

symptoms like leaf-drop, yellowing and wilting (factors that rendered the foliage unfit for arrangement). Observations on vase-life in combination treatments were noted for a period of ten weeks.

RESULTS AND DISCUSSION

On evaluation, it was found that all the foliage plants had significant differences in the characters studied. Quantitative characters of different foliage species is presented in Table 2. Plant height recorded ranged from 37.70cm to 31.40cm. *Cordyline fruticosa* recorded the highest plant height (131.4cm), followed by *Dracaena Purple compacta* (102cm) and *Asparagus sprengeri* (92.7cm). Lowest plant height was recorded in *Dracaena fragrans* ‘Lemon lime’, with 37.7cm. A similar trend was also reported by Russ and Pertuit (2001) in various foliage plants like *Dracaena*, *Philodendron*, *Schefflera*, and some indoor ferns.

Plant-spread is an important character when considering the foliage for its growing environment. It gives an idea about the number of plants that can be accommodated in a given area (plant density). However, in climbers, plant-spread had lesser relevance compared to that in the others that had vertical growth. The highest plant-spread of 117.59cm East-West, and 118.18cm North-South, was noticed in *Asparagus sprengeri*. Lowest plant-spread was noticed in *Philodendron Green Emerald* (30.63cm E-W, 33.37cm N-S). Similar variations were observed by Eapen (2003).

Number of leaves ranged from 13.51 to 196.67. Maximum number of leaves was recorded in *Dracaena reflexa* ‘Song of Jamaica’ (196.67), followed by *Dracaena reflexa* var. *angustifolia* (185.00), *Asparagus setaceus* (137.27) and *Dracaena marginata* (78.95). Lowest number of leaves was observed in *Philodendron* ‘Ceylon gold’ (13.5). Basically, species with larger leaves tended to produce less number of leaves, whereas, species with smaller leaves had greater number of leaves. This variation was due to several factors like genetic make-up, partition of the photosynthates, production of more number of branches and tillers, etc. Our results confirmed the findings of Bulle and Dejongh (2001) and Benedetto *et al* (2006).

Number of shoots too is an important characters contributing to yield. In the present study, shoot number differed significantly between species. *Dracaena reflexa* var. *angustifolia* registered higher number of shoots (7.7), followed by *Dracaena reflexa* (Song of Jamaica) (6.5)

Table 1. List of foliage species evaluated in Shevroys of Eastern Ghats in Tamil Nadu

Botanical name	Family	Common name
<i>Aglaonema crispum</i>	Araceae	Chinese evergreen
<i>Anthurium andreaeanum</i>	Araceae	Lady Jane
<i>Asparagus sprengeri</i>	Liliaceae	<i>Sprengeri</i> fern
<i>Asparagus densiflorus</i>	Liliaceae	Asparagus fern
<i>Asparagus setaceus</i>	Liliaceae	Fern asparagus
<i>Cordyline Chocolate queen</i>	Agavaceae	Ti plant
<i>Cordyline Chocolate swirl</i>	Agavaceae	Ti plant
<i>Cordyline compacta</i>	Araceae	Ti plant
<i>Cordyline fruticosa</i>	Agavaceae	Ti plant
<i>Cordyline negra</i>	Agavaceae	Ti plant
<i>Cordyline tango</i>	Agavaceae	Ti plant
<i>Cordyline terminalis</i>	Agavaceae	Ti plant
<i>Dracaena</i> ‘Purple compacta’	Agavaceae	Ti plant
<i>Dracaena compacta</i>	Agavaceae	Dracaena
<i>Dracaena fragrans</i> ‘Lemon lime’	Agavaceae	Dracaena
<i>Dracaena fragrans</i> ‘Massangeana’	Agavaceae	Corn plant
<i>Dracaena marginata</i>	Agavaceae	Red-edged Dracaena
<i>Dracaena reflexa</i> var. <i>angustifolia</i>	Agavaceae	Song of India
<i>Dracaena reflexa</i> var. Tropical	Agavaceae	Dracaena
<i>Dracaena reflexa</i> ‘Song of Jamaica’	Agavaceae	Song of Jamaica
<i>Dracaena sanderiana</i>	Agavaceae	Corn plant
<i>Heliconia rostrata</i>	Heliconiaceae	Lobster claw
<i>Nephrolepis cordifolia</i>	Polypodiaceae	Erect sword Fern
<i>Nephrolepis falcata</i>	Polypodiaceae	Fishtail sword Fern
<i>Philodendron</i> ‘Ceylon gold’	Araceae	Philodendron
<i>Philodendron</i> Green emerald	Araceae	Philodendron
<i>Philodendron imbe</i> ‘Variegata’	Araceae	Philodendron
<i>Philodendron</i> Red emerald	Araceae	Philodendron
<i>Philodendron xanadu</i>	Araceae	Philodendron

Table 2. Quantitative characters of various foliage species

Species	Plant height (cm)	Plant spread		Leaf no.	Shoot number	Leaf area (cm ²)	Petiole length (cm)	Petiole girth (cm)	Inter-nodal length (cm)	Leaf longevity (d)
		E-W (cm)	N-S (cm)							
<i>Aglaonema crispum</i>	59.80	55.93	50.74	19.50	2.10	130.6	7.75	3.19	-	24.50
<i>Anthurium andreanum</i>	69.90	86.63	88.53	17.50	-	93.06	17.30	2.29	-	22.70
<i>Asparagus sprengeri</i>	92.70	117.59	118.18	55.37	-	3.19	5.24	2.23	-	24.00
<i>Asparagus densiflorus</i>	57.80	34.22	41.50	14.57	-	14.89	5.79	1.50	-	22.40
<i>Asparagus setaceus</i>	53.20	44.73	44.35	133.27	-	33.02	6.25	1.44	-	22.50
<i>Cordyline</i>	54.80	34.68	36.27	30.10	3.30	86.53	4.72	3.66	-	19.00
Chocolate queen										
<i>Cordyline</i>	61.90	40.07	44.13	30.18	3.40	89.60	4.82	3.47	-	21.70
Chocolate swirl										
<i>Cordyline compacta</i>	37.80	39.38	42.80	15.58	1.00	67.62	3.85	2.49	-	19.10
<i>Cordyline fruticosa</i>	131.40	68.03	67.53	30.89	3.30	214.1	6.07	3.28	-	19.90
<i>Cordyline negra</i>	45.40	39.71	41.10	16.52	1.80	171.1	4.19	2.69	-	17.90
<i>Cordyline tango</i>	42.00	42.25	44.20	30.82	4.20	67.98	2.81	2.50	-	18.80
<i>Cordyline terminalis</i>	81.20	59.88	64.44	28.41	1.00	80.16	7.77	2.67	-	21.80
<i>Dracaena</i>	78.30	32.69	37.11	74.97	2.50	42.79	2.63	2.59	-	23.00
'Purple compacta'										
<i>Dracaena compacta</i>	54.00	33.68	39.00	71.28	4.30	41.81	-	-	-	22.40
<i>Dracaena fragrans</i>	37.70	47.64	58.43	24.42	-	39.91	-	-	-	23.50
'Lemon lime'										
<i>Dracaena fragrans</i>	79.10	77.86	83.94	39.52	1.90	289.7	-	-	-	26.70
'Massangeana'										
<i>Dracaena marginata</i>	102.0	67.16	70.68	78.95	1.80	32.33	-	-	-	23.20
<i>Dracaena reflexa</i>	48.20	62.88	71.93	185.0	7.70	17.28	-	-	2.09	19.70
var. angustifolia										
<i>Dracaena reflexa</i>	53.60	39.83	45.01	36.62	3.80	20.49	-	-	1.36	23.50
var. Tropical										
<i>Dracaena reflexa</i>	72.10	65.98	70.12	196.67	6.50	32.42	-	-	-	23.20
'Song of Jamaica'										
<i>Dracaena sanderiana</i>	56.90	63.09	66.60	25.08	1.00	70.44	-	-	-	23.10
<i>Heliconia rostrata</i>	65.80	63.00	71.31	22.40	1.00	47.19	5.61	2.73	-	23.00
<i>Nephrolepis cordifolia</i>	58.20	49.81	50.93	32.08	-	72.13	7.44	0.45	-	22.70
<i>Nephrolepis falcata</i>	64.30	57.34	51.73	19.07	-	43.67	4.53	0.27	-	23.60
<i>Philodendron</i>	36.80	54.40	56.13	13.51	1.00	38.47	5.79	2.64	2.96	19.50
'Ceylon gold'										
<i>Philodendron</i>	50.90	30.63	33.37	21.11	1.00	56.76	14.29	3.28	1.72	18.00
Green emerald										
<i>Philodendron imbe</i>	53.80	34.93	56.93	14.57	1.00	321.6	16.81	3.65	-	24.60
'Variegata'										
<i>Philodendron</i>	70.00	86.80	97.63	19.27	1.00	240.7	5.85	3.82	3.62	22.80
Red emerald										
<i>Philodendron xanadu</i>	47.60	70.24	73.83	42.40	-	61.15	22.23	2.67	-	18.50
S.Ed.	3.66	3.13	3.96	10.72	0.57	20.11	0.31	0.13	0.19	0.64
CD ($P=0.05$)	7.33	6.28	7.94	21.48	1.15	40.3	0.63	0.27	0.38	1.28

and the lowest number of shoots (1.0) was observed in the species of *Heliconia rostrata*, *Philodendron* Red emerald, *Cordyline compacta*, *Cordyline terminalis*, *Philodendron* Green emerald, *Philodendron* 'Ceylon gold' and *Philodendron imbe* 'Variegata'.

Highest leaf area was observed in *Philodendron imbe* 'Variegated' (321.67cm²) followed by *Dracaena fragrans* 'Massangeana' (Corn plant) with 289.79cm², and

Philodendron Red emerald (240.75cm²). Lowest leaf area was observed in *Asparagus sprengeri* (3.19cm²).

Length and girth of petiole are important characters for cut-foilage giving physical support to the leaf. Also, length of the leaf contributes to the spread of a plant. More the petiole length, greater the plant spread. If the petiole is short, high compactness is noticed in leaf arrangement. Petiole length ranged from 2.63cm to 22.23cm.

Table 3. Qualitative characters of various foliage species

Treatment	Leaf type	Venation	Leaf shape	Leaf margin	Leaf tip	Leaf orientation	Texture of the leaf	Foliage colour
<i>Aglaonema crispum</i>	Simple	Pinnate	Oblong	Entire	Acute	Cuneate	Smooth	Pale green
<i>Anthurium andreaeanum</i>	Simple	Pinnate	Acuminate	Entire	Acute	Cuneate	Smooth	Deep green
<i>Asparagus sprengeri</i>	Simple	none	Linear	Entire	Acute	Cuneate	Fine	Deep green
<i>Asparagus densiflorus</i>	Simple	none	Linear	Entire	Acute	Cuneate	Fine	Deep green
<i>Asparagus setaceus</i>	Simple	none	Linear	Entire	Acute	Cuneate	Fine	Deep green
<i>Dracaena</i> ‘Purple compacta’	Simple	Parallel	Lanceolate	Entire	Acute	Attenate	Smooth	Deep purple
<i>Dracaena compacta</i>	Simple	Parallel	Lanceolate	Entire	Acute	Attenate	Smooth	Deep green
<i>Dracaena fragrans</i> ‘Lemon lime’	Simple	Parallel	Lanceolate	Entire	Acute	Attenate	Fine	Yellow
<i>Dracaena fragrans</i> ‘Massangeana’	Simple	Parallel	Lanceolate	Undulate	Acute	Attenate	Coarse	Deep green
<i>Dracaena marginata</i>	Simple	Parallel	Lanceolate	Entire	Acute	Attenate	Smooth	Purple
<i>Dracaena reflexa</i> var. <i>angustifolia</i>	Simple	Parallel	Lanceolate	Entire	Acute	Attenate	Smooth	Pale yellow
<i>Dracaena reflexa</i> ‘Song of Jamaica’	Simple	Parallel	Lanceolate	Entire	Acute	Attenate	Smooth	Deep green
<i>Dracaena reflexa</i> ‘Green’	Simple	Parallel	Lanceolate	Entire	Acute	Attenate	Smooth	Deep purple
<i>Dracaena sanderiana</i>	Simple	Parallel	Lanceolate	Undulate	Acute	Attenate	Coarse	Pale green
<i>Cordyline</i> Chocolate queen	Simple	Parallel	Lanceolate	Entire	Acute	Decurrent	Smooth	Deep green
<i>Cordyline</i> Chocolate swirl	Simple	Parallel	Lanceolate	Entire	Acute	Decurrent	Smooth	Pale sandal
<i>Cordyline compacta</i>	Simple	Parallel	Lanceolate	Entire	Acute	Decurrent	Smooth	Deep purple
<i>Cordyline fruticosa</i>	Simple	Parallel	Lanceolate	Entire	Acute	Attenate	Smooth	Deep green
<i>Cordyline negra</i>	Simple	Parallel	Lanceolate	Entire	Acute	Decurrent	Smooth	Deep pink
<i>Cordyline tango</i>	Simple	Parallel	Lanceolate	Entire	Acute	Decurrent	Smooth	Deep purple
<i>Cordyline terminalis</i>	Simple	Parallel	Lanceolate	Entire	Acute	Decurrent	Smooth	Deep green
<i>Heliconia rostrata</i>	Simple	Pinnate	Ovate	Entire	Acute	Cuneate	Smooth	Deep green
<i>Nephrolepis cordifolia</i>	Simple	none	Lanceolate	Entire	Acute	Cuneate	Fine	Deep green
<i>Nephrolepis falcata</i>	Simple	none	Lanceolate	Entire	Acute	Cuneate	Fine	Deep green
<i>Philodendron</i> ‘Ceylon gold’	Simple	Pinnate	Lanceolate	Entire	Acute	Cuneate	Smooth	Golden Yellow
<i>Philodendron</i> Green emerald	Simple	Pinnate	Lanceolate	Entire	Acute	Cuneate	Smooth	Deep green
<i>Philodendron imbe</i> ‘Variegata’	Simple	Pinnate	Lanceolate	Entire	Acute	Cuneate	Smooth	Deep green
<i>Philodendron</i> Red emerald	Simple	Pinnate	Saggitate	Revolute	Acute	Cuneate	Coarse	Deep purple
<i>Philodendron xanadu</i>	Simple	Pinnate	Entire	Entire	Acute	Decurrent	Coarse	Deep green

Philodendron xanadu recorded the longest petiole (22.23cm), the shortest petiole was observed in *Dracaena* ‘Purple compacta’ (2.63cm). Maximum petiole girth (3.82cm) was recorded in *Philodendron* Red emerald. Minimum petiole girth was observed in *Nephrolepis falcata* (Fishtail sword fern), with 0.27cm. These results are in accordance with those of Wang and Chen (2003) and Mollick *et al* (2011).

As for internode length, most species had short and compact internodes, the very first qualities sought out in decoration. Highest internode length was observed in *Philodendron* Red emerald (3.62cm), followed by *Philodendron* ‘Ceylon gold’ (2.96cm) while, the minimum was observed in *Dracaena reflexa* var. Tropical (1.36cm). Leaf longevity on the plant is linked to leaf production intervals. If a plant produces leaves at longer intervals, longevity of the leaf is found to be higher. *Longevity of the*

leaves on a plant depends upon environmental conditions, genetic factors and incidence of pests and diseases. Longer life of leaves on the plant also helps stagger harvest of the leaves. Under normal conditions, foliage of Dracaena fragrans ‘Massangeana’ (26.7 days), Philodendron imbe ‘Variegata’ (24.6 days) and Aglaonema crispum (24.5 days) was found to have the highest longevity among the plants evaluated. However, shrub-like Cordyline negra (17.9 days) showed lower longevity of leaves than other species (Alex, 2012).

Qualitative traits of different foliage plants are presented in Table 3. Characters like texture, type, shape, margin, tip, base, pigmentation, venation, arrangement of leaves and branching habit, were considered as these relate to aesthetic value of the plants and the arrangement. Plants like *Dracaena reflexa* var. *angustifolia* (Song of India), *Dracaena reflexa* ‘Song of Jamaica’, *Anthurium*

andreaenum (Lady Jane), *Philodendron* 'Ceylon gold' and *Asparagus sprengeri* (*Sprengeri* fern), need adequate staking, as, these tend to bend. *Nephrolepis cordifolia* (Erect sword fern), *Nephrolepis falcata* (Fishtail sword fern) and *Asparagus setaceus* (Asparagus fern) need adequate pruning.

Plants were also rated according to their quality (characters like colour, texture and pigmentation). Among *Dracaena* species, *Dracaena reflexa* var. *angustifolia* rated as good. Similarly, in *Cordyline* species - *Cordyline fruticosa*, *Philodendron* species - *Philodendron xanadu*, *Nephrolepis* species - *Nephrolepis cordifolia*, and *Asparagus* species - *Asparagus sprengeri*, performed well under Eastern Ghats. These can be recommended as the

best foliage plants, possessing all the qualities (to be grown in any type of growing conditions); these are also well-suited for testing under open conditions. This type of visual quality-grading was done earlier by Wang et al (2005).

Keeping-quality is of prime commercial importance in the trade of cut-foliage, besides aesthetics. Pre-harvest and post-harvest factors, together with the stage and time of harvest, determine keeping-quality of the foliage for vase-life. If harvested at the immature or over-mature stage, the foliage does not keep well, and, the desired effect of foliar variegation is not fully achieved by a foliage arrangement. Generally, foliage is cut when mature, having fully attained its shape, colour and size. Kumar and Bhattacharjee (2003) reported foliage of *Calathea ornata*, *Codium variegatum*,

Table 4. Effect of pulsing treatment on cut foliage at Shevroys condition (days)

Name of the species	P ₀	P ₁	P ₂	P ₃	P ₄
<i>Aglaonema crispum</i>	8.40	10.1	12.3	10.3	15.8
<i>Anthurium andreaenum</i>	10.0	10.1	11.8	10.8	17.4
<i>Asparagus sprengeri</i>	7.60	8.50	10.5	8.90	17.5
<i>Asparagus densiflorus</i>	7.50	7.90	9.50	8.30	18.6
<i>Asparagus setaceus</i>	8.00	9.20	12.3	9.90	17.9
<i>Cordyline</i> Chocolate queen	8.70	10.4	11.8	10.3	20.3
<i>Cordyline</i> Chocolate swirl	7.80	8.30	10.3	8.80	17.1
<i>Cordyline fruticosa</i>	8.60	8.20	9.10	8.70	19.7
<i>Cordyline negra</i>	8.30	9.50	10.6	9.50	18.5
<i>Cordyline tango</i>	10.4	10.5	11.5	10.8	18.3
<i>Cordyline terminalis</i>	8.30	9.50	10.8	9.50	19.4
<i>Cordyline compacta</i>	8.50	10.4	10.1	9.70	19.5
<i>Dracaena</i> 'Purple compacta'	9.20	10.1	10.6	10.0	20.6
<i>Dracaena compacta</i>	9.60	9.80	9.60	9.70	16.8
<i>Dracaena fragrans</i> 'Lemon lime'	9.30	11.7	12.7	11.2	16.5
<i>Dracaena fragrans</i> 'Massangeana'	10.40	9.00	12.9	10.8	19.0
<i>Dracaena marginata</i>	8.10	9.90	12.0	10.0	20.1
<i>Dracaena reflexa</i>	12.9	9.80	10.2	10.9	17.1
<i>Dracaena reflexa</i> var. Tropical	8.50	8.20	9.50	8.70	18.4
<i>Dracaena reflexa</i> 'Song of Jamaica'	9.10	8.90	9.40	9.10	17.9
<i>Dracaena sanderiana</i>	9.10	9.00	9.70	9.20	19.7
<i>Heliconia rostrata</i>	7.90	8.10	13.3	9.80	19.9
<i>Nephrolepis cordifolia</i>	8.90	8.90	11.2	9.70	19.3
<i>Nephrolepis falcata</i>	8.80	8.30	10.5	9.20	17.1
<i>Philodendron</i> 'Ceylone gold'	7.40	8.30	10.8	8.80	17.0
<i>Philodendron</i> Green emerald	8.20	7.80	10.3	8.80	19.6
<i>Philodendron imbe</i> 'Variegata'	7.70	8.20	11.3	9.10	17.5
<i>Philodendron</i> Red emerald	9.20	8.90	11.3	9.80	17.9
<i>Philodendron xanadu</i>	8.00	8.20	10.1	8.70	20.0
SEd	0.48	0.55	0.61	0.88	0.74
CD (<i>P</i> =0.05)	0.97	1.11	1.23	1.77	1.49

P₀ - Filtered water, P₁- Acidified water (pH 3.5), P₂- Sucrose 5%, P₃- Sucrose 5% + AgNO₃ 50ppm, P₄- Sucrose 5% + AgNO₃ 100ppm

Table 5. Effect of the holding solution on cut foliage plants at Shevroys condition (days)

Name of the species	H ₀	H ₁	H ₂	H ₃	H ₄
<i>Aglaonema crispum</i>	8.40	6.70	10.7	14.0	13.6
<i>Anthurium andreaenum</i>	6.40	6.50	11.3	15.0	15.5
<i>Asparagus sprengeri</i>	6.70	7.20	11.5	15.3	15.3
<i>Asparagus densiflorus</i>	5.70	6.40	10.0	12.7	14.1
<i>Asparagus setaceus</i>	7.30	5.80	11.3	13.6	15.5
<i>Cordyline</i> Chocolate queen	7.40	7.50	12.5	12.9	13.7
<i>Cordyline</i> Chocolate swirl	6.90	5.70	13.4	14.7	15.2
<i>Cordyline fruticosa</i>	7.20	7.50	10.9	13.3	14.5
<i>Cordyline negra</i>	6.40	6.60	11.4	12.3	14.1
<i>Cordyline tango</i>	7.00	7.50	12.2	13.4	13.7
<i>Cordyline terminalis</i>	7.30	6.20	9.90	13.3	14.5
<i>Cordyline compacta</i>	7.00	7.00	11.6	13.5	15.3
<i>Dracaena</i> 'Purple compacta'	7.10	6.10	11.5	12.9	12.9
<i>Dracaena compacta</i>	6.20	6.30	11.7	14.1	15.7
<i>Dracaena fragrans</i> 'Lemon lime'	7.10	6.20	11.2	12.4	16.2
<i>Dracaena fragrans</i> 'Massangeana'	8.40	7.30	11.5	15.0	15.5
<i>Dracaena marginata</i>	5.20	5.40	10.4	14.5	15.2
<i>Dracaena reflexa</i>	7.00	7.50	8.60	15.1	14.7
<i>Dracaena reflexa</i> var. Tropical	6.50	6.60	11.3	13.6	14.5
<i>Dracaena reflexa</i> 'Song of Jamaica'	7.20	5.60	10.3	15.9	16.3
<i>Dracaena sanderiana</i>	6.50	7.20	12.6	14.5	16.1
<i>Heliconia rostrata</i>	7.40	6.00	11.3	13.7	14.3
<i>Nephrolepis cordifolia</i>	7.80	6.50	10.1	12.1	14.4
<i>Nephrolepis falcata</i>	7.60	6.90	12.2	14.3	15.3
<i>Philodendron</i> 'Ceylone gold'	6.50	5.90	11.9	10.0	13.4
<i>Philodendron</i> Green emerald	7.70	6.00	12.1	14.1	15.4
<i>Philodendron imbe</i> 'Variegata'	6.30	6.80	11.4	15.3	15.1
<i>Philodendron</i> Red emerald	7.70	6.70	11.7	13.1	16.2
<i>Philodendron xanadu</i>	7.90	6.40	11.9	12.9	14.4
S.Ed.	0.40	0.36	0.70	1.10	0.74
CD (<i>P</i> = 0.05)	0.81	0.72	1.40	2.21	1.49

*H₀ - Filtered water, H₁- Acidified water (pH 3.5), H₂ - Sucrose 5%, H₃ - Sucrose 5% + AgNO₃ 25ppm, H₄ - Sucrose 5% + AgNO₃ 50ppm

Dracaena sp. and *Nephrolepis* sp. as having longer vase-life when the leaves were mature and fully expanded.

Pulsing is a short-term treatment given to cut-foliage immediately following harvest, to improve keeping quality. Data on effect of pulsing solutions on vase-life of different species of cut-foliage are furnished in Table 4. Among the pulsing solutions used, highest vase-life was recorded in *Dracaena* 'Purple compacta' under P₄ (Sucrose 5% + AgNO₃ 100ppm), with 20.6 days. This was significantly superior to the other pulsing solutions and was followed by *Cordyline* 'Chocolate queen' in P₄ (Sucrose 5% + AgNO₃ 100ppm), with 20.3 days. Minimum vase-life of 7.5 days was recorded in P₀ (Filtered water) in *Asparagus densiflorus*.

Data on effect of holding solutions on vase-life of different species of cut-foliage are furnished in Table 5. Holding solutions significantly influenced vase-life. Among the holding solutions tested, highest vase-life was recorded in H₄ (Sucrose 5% + AgNO₃ 50ppm), with 16.3 days in *Dracaena reflexa* 'Song of Jamaica'. This was significantly superior to other holding treatments, followed by H₃ (Sucrose 5% + AgNO₃ 25ppm) with 16.2 days in *Dracaena fragrans* 'Lemon lime' and *Philodendron* Red emerald. A minimum vase-life of 5.4 days was recorded in *Dracaena marginata* in H₁ (Acidified water).

In conclusion, *Nephrolepis cordifolia* and *Asparagus sprengeri* can be recommended as suitable liners, while, large-leaved species like *Cordyline fruticosa* and *Philodendron xanadu* as background materials for larger arrangements, and the smaller-leaved *Dracaena reflexa* var. *angustifolia* for smaller arrangements.

ACKNOWLEDGEMENT

The authors are thankful to Tamil Nadu agricultural University, Coimbatore, and AICRP-Floriculture, Indian Council of Agricultural Research, New Delhi, for financial assistance for successful conduct of the experiment at Horticultural Research Station, Yercaud.

REFERENCES

- Alex, R. 2012. Evaluation of foliage plants for interior plantscaping. Ph.D. thesis, Kerala Agricultural University, Vellanikkara, Thrissur, Kerala, India, 130p
- Anonymus, 2011a. Facts and Figures, 2010 [on-line]. Flora Holland (Dutch Agricultural Wholesale Board/ Flowers and Plants): <http://www.floraholland.com> [22 Dec. 11]
- Anonymus, 2011b. DGCIS [Directorate General of Commercial Intelligence and Statistics], Ministry of Commerce and Industry, Government of India [on-line]: <http://www.dgciskol.nic.in> [21 Dec. 2011]
- Benedetto, A.D., Molinari, J., Boschi, C., Benedicto, D., Cerrotta, M. and Cerrotta, G. 2006. Estimating crop productivity for five ornamental foliage plants. *Int'l. J. Agri. Res.*, **1**:522-533
- Bulle, A. and De Jongh, M. 2001. Effects of growing conditions on the shelf life of *Ficus benjamina*. *Acta Hort.*, **543**:113-117
- Eapen, S.M. 2003. Evaluation of tropical plant species for use as cut foliage. M.Sc. (Hort.) thesis, Kerala Agricultural University, Vellanikkara, Thrissur, Kerala, India, 74p
- Kumar, V. and Bhattacharjee, S.K. 2003. Exploring cut greens for florist trade. *Indian Hort.*, **47**:4-9
- Mollick, A.S., Shimoji, H., Denda, T., Yokata, M. and Yamasaki, H. 2011. Croton - *Codiaeum variegatum* (L.) Blume cultivars characterized by leaf phenotypic parameters. *Sci. Hort.*, **132**:71-79
- Russ, K. and Peruit, A. 2001. Foliage plants. <http://hgic.clemson.edu/factsheets/-HGIC11504>
- Wang, Q. and Chen, J. 2003. Variation of photosynthetic characteristics and leaf area contributes to *Spathiphyllum* cultivar differences in biomass production. *Photosynthetica*, **41**:443- 447
- Wang, Q., Chen, J., Stamps, R.H. and Li, Y. 2005. Correlation of visual quality grading and SPAD reading of green leaves foliage plants. *J. Pl. Nutr.*, **28**:1215-1225

(MS Received 29 October 2014, Revised 03 January 2015, Accepted 20 January 2015)