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Leaf parameters as influenced by shade sources in different cut greens

Padma Priya P, Rajendra Prasad K, Dorajee Rao AVD and Umakrishna K

Abstract
A study was undertaken at Horticultural Research Station, Pandirimamidi with the objective of analysing the effect of sources of shade (*Borassus flabellifer* shade and green net shade) on growth and foliage parameters of cut greens. Eight cut greens *viz.*, Alocasia, Aglaonema, Codiaeum, Cordyline, Dieffenbachia, Calathea, *Dracaena* 'Mahatma' and Philodendron were grown under *Borassus fabellifer* and green net shade for evaluating them in respect of growth and foliage characters. The cut greens grown under *Borassus flabellifer* shade which was more thicker, performed better in terms of foliage characters. Among the cut greens calathea exhibited maximum values for leaf length, leaf width and leaf area. Dracaena recorded maximum number of leaves among the cut greens. With respect to interaction leaf length, leaf width and leaf area were found highest in the combination of *Borassus flabellifer* shade + Calathea whereas, number of leaves was maximum in the combination of *Borassus flabellifer* shade + Dracaena.

Keywords: Shade source, cut greens, *Borassus flabellifer* shade

Introduction
Cut greens are foliage ornamentals used as fillers in floral arrangements. Their presence makes the arrangements diversified, fresh and colourful. These are generally grown under shade.
Palmyrah (*Borassus flabellifer*), is an important plantation crop in India. It is a multipurpose tree mainly found in South India. The palm is grown in the states of Tamil Nadu and Andhra Pradesh greater than others. Borassus is regarded as poor man's palm in rural areas (Ankitha *et al.*, 2018) [2]. Palmyrah palms on account of their high juvenile period (12-15 years) provide an opportunity for inter cultivation of shade loving crops. In order to take the advantage of borassus palm shade, the present investigation has been conducted to evaluate the performance of cut green plants.

Materials and Methods
The present study was conducted on performance of cut greens under palmyrah plantation and green net shade was conducted at Dr. YSRHU- Horticultural Research Station, Pandirimamidi. The experimental design was Factorial Completely Randomized Design comprising sixteen treatment combinations *viz.*, S_1G_1: *Borassus flabellifer* shade + Alocasia, S_1G_2: *Borassus flabellifer* shade + Aglaonema, S_1G_3: *Borassus flabellifer* + Codiaeum, S_1G_4: *Borassus flabellifer* shade + Cordyline, S_1G_5: *Borassus flabellifer* shade + Dieffenbachia, S_1G_6: *Borassus flabellifer* shade + Calathea, S_1G_7: *Borassus flabellifer* shade + *Dracaena* 'Mahatma', S_1G_8: *Borassus flabellifer* shade + Philodendron, S_2G_1: Green net shade + Alocasia, S_2G_2: Green net shade + Aglaonema, S_2G_3: Green net shade + Codiaeum, S_2G_4: Green net shade + Cordyline, S_2G_5: Green net shade + Dieffenbachia, S_2G_6: Green net shade + Calathea, S_2G_7: Green net shade + *Dracaena* 'Mahatma', S_2G_8: Green net shade + Philodendron. The individual combinations were replicated twice. The plants were grown in potting mixture of soil: FYM: vermicompost (1:1:1). The polybag containers were of 12 inch size. The intercultural operations *viz.*, irrigation, fertilizer application, weeding, plant protection measures *etc.*, were done as per the recommendations. Data on foliage parameters were recorded.

Results and Discussion
Number of leaves
The data (Table-1) exhibited that plants grown under *Borassus flabellifer* shade recorded significantly maximum number of leaves at 180 days after planting.

Among cut greens, dracaena recorded the highest number of leaves (22.95) significantly superior to cordyline (20.65). Alocasia recorded the lowest number of leaves (5.40). With respect to the combinations among the shade source and cut greens, the highest number of leaves was registered by the combination of *Borassus flabellifer* shade + dracaena (23.20) which was followed by green net shade + dracaena (22.70) whereas, the lowest value (5.10) was recorded in green net shade + alocasia. Similar increase in leaf number with reduced light intensity was observed by Chen *et al.* (1999) [3].

Leaf length

Leaf length recorded significantly maximum (32.56 cm) at 180 DAP in plants grown under *Borassus flabellifer*. The results recorded on the leaf length of cut greens revealed that calathea recorded the highest leaf length (48.43 cm) significantly superior to dracaena (34.29 cm) whereas, the mean minimum leaf length was observed in alocasia (19.15 cm). The interaction revealed that the highest leaf length was registered by the combination of *Borassus flabellifer* shade + calathea (51.40 cm) which was followed by green net shade + calathea (45.45 cm). Green net shade + alocasia (13.51 cm) recorded the lowest leaf length. (Table-1).

Leaf width

Plants grown under *Borassus flabellifer* recorded significantly maximum leaf width (12.44 cm) (180 DAP). The data on the leaf width of cut greens revealed that calathea recorded significantly maximum leaf width of 28.73 cm and this was followed by dieffenbachia (13.70 cm). Codiaeum (7.73 cm) exhibited minimum leaf width. Highest leaf width was registered by the combination of *Borassus flabellifer* shade + calathea (29.80 cm) which was followed by green net shade + calathea (27.66 cm), whereas the lowest leaf width was recorded in net shade + alocasia (7.20 cm) (Table-2).

This might be due to the fact that cell expansion could take place in order to compensate for lesser light in shaded locations for the purpose of maintaining photosynthetic rate. Such an expansion in leaf size under borassus shade might be also mediated by low temperature and high humidity that would improve rate of cell multiplication rate. Similar outcome was reported by Retamales *et al.* (2008) [7]. Leaf size was higher under thick shade in Anthurium (Agasimani *et al*., 2011) [1].

Leaf area

The results on average leaf area due to the influence of shade sources are presented in Table 2. Plants grown under *Borassus flabellifer* shade recorded significantly maximum average leaf area (118.52 cm^2) at 180 days after planting. The data on cut greens revealed that calathea recorded the highest average leaf area (332.83 cm^2) followed by dieffenbachia (158.3 cm^2) and the lowest average leaf area was recorded in alocasia (44.29 cm^2). The results on interaction of shade source and cut greens, the highest average leaf area was registered by the combination of *Borassus flabellifer* shade + calathea recorded the highest value for average leaf area (336.54 cm^2) superior to green net shade + calathea (329.12 cm^2). The lowest average leaf area was recorded in green net shade + alocasia (24.90 cm^2).

Identical results were reported in *Dracaena fragrans*. Similarly, larger leaf areas were produced under low intensities revealed that since, leaves perceived light signals. The light signal gets converted to chemical signal and reaches apical meristem to control cell division and cell expansion *etc.* (Kendrick and Weller, 2003) [5]. This might be the reason for increase in number of leaves and leaf area under high shade conditions, as observed in this study. Similarly, the differences in cut greens might be due to their inherent genotypic differences.

Table 1: Influence of shade source on number of leaves, leaf length of different cut greens

Cut greens (G)	Shade source (S)					
	Number of leaves			Leaf length (cm)		
	S_1: *Borassus flabellifer shade*	S_2: Green net shade	Mean of G	S_1: *Borassus flabellifer shade*	S_2: Green net shade	Mean of G
G_1: Alocasia	5.70 (2.58)	5.10 (2.47)	5.40 (2.52)	24.80	13.51	19.15
G_2: Aglaonema	8.80 (3.13)	7.80 (2.96)	8.30 (3.04)	33.20	30.51	31.85
G_3: Codiaeum	14.30 (3.91)	11.70 (3.73)	13.00 (3.73)	26.90	23.00	24.95
G_4: Cordyline	21.50 (4.74)	19.80 (4.65)	20.65 (4.65)	32.01	30.10	31.06
G_5: Dieffenbachia	5.80 (2.60)	5.70 (2.59)	5.75 (2.59)	34.00	33.40	33.70
G_6: Calathea	8.30 (3.05)	7.10 (2.94)	7.70 (2.94)	51.40	45.45	48.43
G_7: Dracaena	23.20 (4.91)	22.70 (4.89)	22.95 (4.89)	34.61	33.98	34.29
G_8: Philodendron	18.50 (4.41)	16.90 (4.23)	17.70 (4.32)	23.60	22.20	22.90
Mean of S	13.26 (3.67)	12.10 (3.51)	12.68 (3.59)	32.56	29.02	30.76

Factors	S.E(m)	CD at 5%	S.E(m)	CD at 5%
Shade source (S)	0.006	0.01	0.11	0.33
Cut green (G)	0.01	0.05	0.22	0.67
S x G	0.01	0.05	0.31	0.95

Table 2: Influence of shade source on leaf width and leaf area of different cut greens

Cut greens (G)	Shade source (S)					
	Leaf width (cm)			Leaf area (cm^2)		
	S_1: *Borassus flabellifer shade*	S_2: Green net shade	Mean of G	S_1: *Borassus flabellifer shade*	S_2: Green net shade	Mean of G
G_1: Alocasia	13.20	7.20	10.20	63.67	24.90	44.29
G_2: Aglaonema	9.50	7.85	8.68	87.60	60.59	74.10
G_3: Codiaeum	7.90	7.55	7.73	58.20	65.74	61.97
G_4: Cordyline	8.00	8.20	8.10	69.15	62.80	65.98
G_5: Dieffenbachia	14.05	13.35	13.70	168.10	148.56	158.33
G_6: Calathea	29.80	27.66	28.73	336.54	329.12	332.83
G_7: Dracaena	8.85	8.30	8.58	97.85	96.10	96.98
G_8: Philodendron	8.26	7.95	8.10	67.01	64.30	65.66
Mean of S	12.44	11.01	11.72	118.52	106.51	112.51
Factors	S.E(m)		CD at 5%	S.E(m)		CD at 5%
Shade source (S)	0.09		0.27	0.51		1.54
Cut green (G)	0.19		0.57	1.03		3.09
S x G	0.27		0.81	1.46		4.37

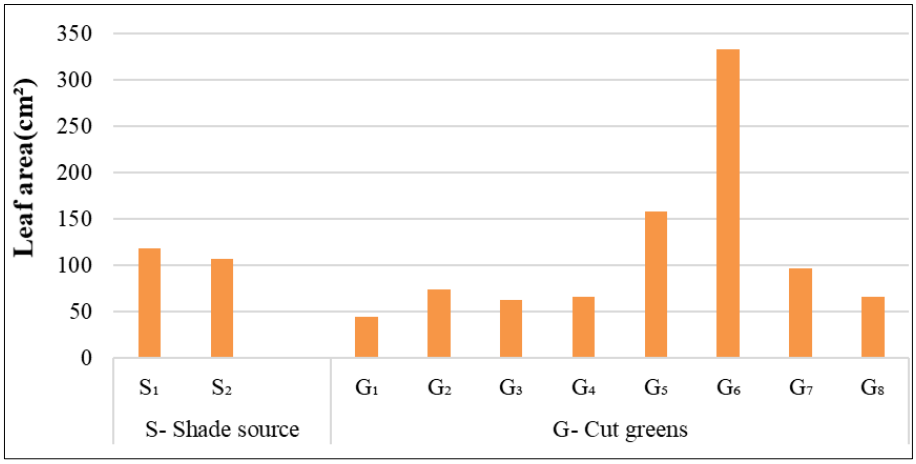

Fig 1: Average leaf area (cm^2) as influenced by shade source in different cut greens

Conclusion

Therefore, *Borassus flabellifer* shade can be recommended for growing cut greens. Similarly, leaf parameters were also significantly higher under the shade source of borassus shade relative to green net shade. Calathea was found to exhibit maximum values in respect of leaf parameters under borassus shade among the different cut greens. Calathea, dracaena and dieffenbachia were found to exhibit attractive foliage with their leaf shape, leaf size and leaf colour. Thus, ornamental foliage plants as listed above can be opted for profitable cultivation under borassus palm fields. So as to use land and other resources effectively by maximizing profits. (Remison, 1982) [6].

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