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Performance of Foliage Filler Crops under Rubber Plantation

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A B S T R A C T

Foliage filler crops forms the backbone of cut flower arrangements. A study was undertaken at Horticultural Research Station, Tamil Nadu Agricultural University, Pechiparai with the objective of evaluating the performance of foliage filler crops under rubber plantations. Six foliage filler crops *viz.*, *Aglaonema* 'Earnesto Favourite', *Thuja orientalis*, *Calathea princeps* ,T_4 : *Asparagus densiflorus* 'Sprengeri',T_5 : *Draecena deremensis* 'Song of India' and T_6 : *Asparagus plumosus* were grown as intercrop in the rubber plantation and were evaluated for their growth and yield of cut stems in shady condition. It was observed that more number of cut foliages was produced by *Asparagus plumosus*as 30.58 per plant and 122.32 per m^2 and this was followed by the *Draecena* 'Song of India' as 28.58 per plant and 114.00 per m^2.Regarding the vase life of cut foliages, the intercrop *Draecena* 'Song of India' recorded highest vase life with 23.14 days and this was followed by *Asparagus plumosus* (18.73 days).

Introduction

Plantation refers to the monoculture crops, which are cultivated on an extensive scale over a large area. Among the plantation crops, rubber is one of the important crops which play an important role in income generation for small-scale farmers in the humid and sub-humid tropics. Though rubber is a remunerative plantation crop, the initial seven year period remains unproductive and the land efficiency in these plantations is low. The wider alley space available between the rubber trees offers a scope for intercropping. Intercropping with short duration annuals and semi perennials enhance both land use efficiency and income generation. Fillers and foliage form the backbone of cut-flower arrangements. Most of the foliage plants are shade loving. By introducing these plants under the shade of rubber will solve the purpose of improving the land use efficiency of rubber plantations as well as to generate additional income. These foliages if grown as mono crop, requires shade for their growth and construction of artificial shade structure increases the cost of cultivation of these cut foliages. But, if the natural rubber shade is utilized to grow, these shade loving foliages become economically important.

As, most of these foliage plants are shade loving, introducing these plants under the shade of rubber will solve the purpose of improving the land use efficiency of rubber plantations as well as to generate additional income. With this in view, a research programme was formulated to test the performance of the commercially important foliage filler ornamental plants as intercrops under the shade of rubber.

Materials and Methods

The present investigation on studying the performance of foliage and filler plants under rubber plantations was conducted at Horticultural Research Station, Pechiparai, Tamil Nadu Agricultural University during the year 2016-17. The experiment was laid out in Randomized Block Design comprising six treatments *viz*., $T_{1:}$ *Aglaonema*' Earnesto Favourite', T_2: *Thuja orientalis,* T_3: *Calathea princeps,* $T_{4:}$ *Asparagus densiflorus*' Sprengeri', $T_{5:}$ *Draecena* 'Song of India' and $T_{6:}$ *Asparagus plumosus.* The individual treatments were replicated thrice. The plot size of individual replication was maintained as 4 x 4 m. The foliage and filler plants were planted as intercrop in rubber plantation of three years old planted at a spacing of 6.7 X 3.4m. The intercultural operations *viz*., irrigation, fertilizer application, weeding, plant protections measures *etc*., were done as per the recommendations. Observations were recorded on the parameters like plant height, petiole length, plant spread, no. of cut foliages per plant and no. of cut foliages per m^2. The data on various parameters were analyzed statistically as per the procedure suggested by Panse and Sukhatme (1985).

Results and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized below.

The data pertaining to the performance of foliage and filler crops grown under rubber plantation is given in Table 1& 2. The data recorded on the plant height of foliage and filler crops revealed that the treatment $T_{6:}$ *Asparagus plumosus* recorded a highest plant height of 95.94 cm and this was followed by the treatment $T_{5:}$ *Draecena* 'Song of India' which recorded a plant height of 78.29 cm. The increase in plant height and length could be due to the rapid growth of the plants, accumulation of more chlorophyll, dark green bigger sized leaf and more number of leaves under shade. Under shading the photosynthetic rate increased and the respiration rate decreased and the chloroplast structure developed normally. This is in conformity with the findings of Fan yanping *et al.*2003 in *Spathiphyllum* and Daubenmire (1974) in anthurium in which the low light increases the vegetative growth. Competition for light can be manifested strategically as an increased rate of height growth, or under lower disturbance frequency increased ultimate height.

In this study, there is a gap in the height distribution among the species. This is in conformity with the findings of King, (1993) who identified that the height immediately below the gap would have the same gain as the strategy immediately above the gap. Thus the gap in the height distribution is the inefficient outcome of an arms race between plants competing for light. The treatment $T_{4:}$ *Asparagus densiflorus* 'Sprengeri' recorded the lowest plant height of 35.18 cm. Regarding the data on the petiole length, among the intercrops the treatment T_3: *Calathea princeps* has recorded highest petiole length 25.30 cm and this was followed by the treatment $T_{6:}$ *Asparagus plumosus* with a petiole length of 20.12 cm. The treatment $T_{6:}$ *Asparagus plumosus* recorded highest plant spread (NS - 126.26 cm & EW - 128.38 cm) and the lowest plant spread was observed in $T_{5:}$ *Draecena* 'Song of India' (NS - 85.18 cm & EW - 83.78 cm). In this experiment the increased leaf area in higher extent of leaf elongation rate and leaf width of upper leaves and in several cases it could be associated with an increase of apical dome size (Bultynck *et al.,* 2004). In comparison with duration of leaf elongation, the rate of leaf expansion is more sensitive to fluctuating environment as was also stated by Hay and Porter (2006).

Table.1 Growth performance of intercrops under rubber plantation

Treatments	Plant Height (cm)	Petiole length (cm)	Plant spread (cm) - NS	Plant spread (cm) - EW
$T_{1:}$ ***Aglaonema*'EarnestoFavourite'**	70.24	13.20	105.51	108.49
T_2: ***Thujaorientalis***	65.03	10.12	90.72	88.47
T_3: ***Calatheaprinceps***	64.92	25.30	100.50	102.58
$T_{4:}$ ***Asparagus densiflorus*'Sprengeri'**	35.18	12.54	85.49	88.62
$T_{5:}$ ***Draecena* 'Song of India'**	78.29	3.21	85.18	83.78
$T_{6:}$ ***Asparagus plumosus***	95.94	20.12	126.26	128.38
SEd	**3.169**	**0.717**	**4.480**	**4.536**
CD (0.05)	**7.062**	**1.598**	**9.983**	**10.107**

Table.2 Yield performance of intercrops under rubber plantation

Treatments	No. of cut foliages per plant	No. of cut foliages per m^2	Vase life (days)
$T_{1:}$ ***Aglaonema*'EarnestoFavourite'**	20.27	81.08	7.23
T_2: ***Thujaorientalis***	23.25	93.00	14.99
T_3: ***Calatheaprinceps***	28.28	113.12	5.34
$T_{4:}$ ***Asparagus densiflorus*'Sprengeri'**	24.22	96.88	17.85
$T_{5:}$ ***Draecena* 'Song of India'**	28.50	114.00	23.14
$T_{6:}$ ***Asparagus plumosus***	30.58	122.32	18.73
SEd	**1.165**	**4.670**	**0.690**
CD (0.05)	**2.596**	**10.406**	**1.536**

Yield is a complex character which involves the interaction of several intrinsic and external factors. It largely depends upon the production, uptake of nutrients and water from the soil and light. In the present study, more number of cut foliages was produced in $T_{6:}$ *Asparagus plumosus* as 30.58 per plant and 122.32 per m^2 and this was followed by the $T_{5:}$ *Draecena* 'Song of India' as 28.58 per plant and 114.00 per m^2. Lowest yield was observed in the treatment T_2: *Thuja orientalis* as 23.25 per plant and 93.00 per m^2.There was a significant difference in the case of number of leaves between the species under shaded conditions. The leaf production is highly influenced by the harvest of solar energy. In this study the different species were grown in shade, mainly for the maintenance of quality in terms of attractive leaf colour. Manju, 2016 observed that *Draceana fragrans* cv.

Massangeana grown as intercrop in rubber plantation recorded highest leaf production of 29.7 nos. of leaves per plant.

Regarding the vase life of cut foliages, among the treatments, the intercrop $T_{5:}$ *Draecena* 'Song of India' recorded highest vase life with 23.14 days and this was followed by $T_{6:}$ *Asparagus plumosus* (18.73 days) wherein, $T_{6:}$ *Asparagus plumosus* recorded vase life of 14.73 days. In the present study shelf life of the foliage showed an appreciable variation. Live cut foliages have a limited life. The majority of cut foliages can be expected to last several days with proper care. This generally requires standing them in water in shade. Similar results have been reported by Manju, 2016 when *Draceana fragrans* cv. *Massangeana* grown as intercrop in rubber plantation, it recorded ashelf life of 32.06 days. Intercropping provides an important means of raising not only productivity and land-use efficiency of smallholder rubber lands, but also income generation during the unproductive immature phase of the rubber tree (Stirling, 1997). Intercropping with shorter duration annual and perennial crops offers one means of improving both land-use and income generation during the unproductive immature stage of rubber.

Besides the benefits of yield and income, intercropping produce social benefits to both the land-holder and the surrounding community (Geno and Geno, 2001). Bradfield (1986) noted that updating traditional intercropping practices (as opposed to promoting monocultures) offers the potential of scale specific technologies that favor the small farmer. Yield advantage occurs because growth resources such as light, water, and nutrients are completely absorbed and converted to crop biomass by the intercrop over time and space as a result of differences in competitive ability for growth resources between the component crops. The crops exploit the variation among the mixed crops in characteristics such as rates of canopy development, final canopy size (width and height), photosynthetic adaptation of canopies to irradiance conditions, and rooting depth (Tsubo *et al.,* 2001). Intercropping has been identified as a promising system that results in an effective use of land and other resources (Remison, 1982b).

References

Bradfield, M.L. 1986. Canopy characteristics associated with deficient and excessive cotton plant population densities, Crop Sci. 34.: 1291–1297.

Bultynck P., Daswir, Harris A.S. and Dja'far D. 2004. Analysis of cacao shaded with coconut (*Cocos nucifera*) compared with *Leucaena glauca* in North Sumatra.

Daubenmire, L. 1974. Influence of rubber canopy on intercrop productivity. Trans. malaysian Soc. Plant Physiol. 2: 75-79.

Fan Yanping, I.P. 2003. Resource capture and utilization in intercropping; non-nitrogen nutrients. Field Crops Res., 34: 303-317.

Geno, L.P and Geno C.N. 2001. Adaptive research for intercropping: steps towards the transfer of intercrop research findings to farmers, fields. Field Crop Res., 34(3-4): 459-467.

Hay and Porter. 2006. An analytical assessment of agroforestry practices resulting from interplanting cacao and kola on soil properties in South-Western Nigeria. Agriculture Ecosystems and Environment 30(3-4): 337–346.

King, P.S. 1993. Forage production of sorghum and alfalfa in sole and intercropping systems. AsianJ. Plant Sci., 6(5): 833-838.

Manju, M. 2016. Enhancing the land use

efficiency of rubber plantation by intercropping with foliage filler crops. M.Sc Thesis, Tamil Nadu Agricultural University, Coimbatore.

Panse, V.G. and P.V. Sukhatme 1978. Statistical method for agricultural workers, II Edn.ICAR, New Delhi, India.

Remison. A. 1982. Yield and nutritive value for mixture of different winter forage crops. Egypt. J. Agron., 9: (1-2): 65-74.

Stirling, C.M., Williams, J.H., Black, C.R and Ong, C.K., 1990. The effect of timing of shade on development, dry matter production and light-use efficiency in groundnut (*Arachis hypogaea*) under field conditions.Aust. J. Agric. Res. 41: 633-644.

Tsubo, M., Walker, S and Mukhala E. 2001. Comparisons Of Radiation Use Efficiency Of Mono-.Inter-Cropping Systems with Different Row Orientations. Field Crops Res 71:17-29.

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