

**SHADE TOLERANCE RANKINGS OF RAIN FOREST TREE  
SEEDLINGS, SOUTHWEST OF SRILANKA**

**BY**

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## DECLARATION

The work described in this thesis was carried out by me under the supervision of Dr B M P Singhakumara and Prof P M S Ashton and a report on this has not been submitted in whole or in part to any University for another Degree/Diploma.

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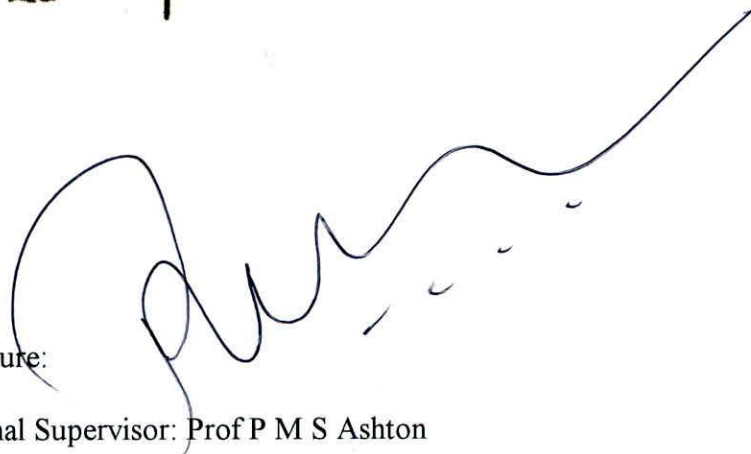
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## ABBREVIATIONS

acin	<i>Anisophyllea cinnamomoides</i>	Pn	Photosynthetic rate
aint	<i>Agrostistachys intramaginalis</i>	pnig	<i>Psychotria nigra</i>
Amax	maximum photosynthesis	PPFD	Photosynthetic Photon Flux Density
ANOVA	Analysis of Variance		
bcey	<i>Bhesa ceylanica</i>	ppet	<i>Palaquium petiolare</i>
bell	<i>Byrsophyllum ellipticum</i>	ps	partial-shade
BT	blade thickness	pthw	<i>Palaquium thwaitesii</i>
cbra	<i>Calophyllum bracteatum</i>	R: FR	Red Far-Red ratio
ccal	<i>Carallia brachiata</i>	rmr	root mass ratio
cg	canopy generalists	RCD	Root collar diameter
cr	canopy restricted	saff	<i>Shorea affinis</i>
cros	<i>Cullenia rosayroana</i>	scas	<i>Schumacheria castaneifolia</i>
ctra	<i>Calophyllum trapezifolium</i>	scoc	<i>Symplocos cochinchinensis</i>
czey	<i>Cullenia zeylanica</i>	scon	<i>Shorea congestiflora</i>
dbh	diameter at breast height	scor	<i>Shorea cordifolia</i>
dqua	<i>Diospyros quaesita</i>	sdis	<i>Shorea disticha</i>
dzey	<i>Dipterocarpus zeylanicus</i>	sfir	<i>Syzygium firmum</i>
fs	full-sun	sgar	<i>Shorea gardneri</i>
gher	<i>Garcinia hermonii</i>	sh	deep-shade
GLM	General Linear Model	SLA	Specific leaf area
gvag	<i>Gaertnera vaginans</i>	smak	<i>Syzygium makul</i>
hlau	<i>Humboldtia laurifolia</i>	smeg	<i>Shorea megistophylla</i>
HT	height	snee	<i>Syzygium neesianum</i>
K	stomatal conductance	sope	<i>Syzygium operculatum</i>
lind	<i>Leea indica</i>	srub	<i>Syzygium rubicundum</i>
lmr	leaf-mass ratio	ssti	<i>Shorea stipularis</i>
mcle	<i>Memecylon clerkeanum</i>	stra	<i>Shorea trapezifolia</i>
mfer	<i>Mesua ferrea</i>	swor	<i>Shorea worthingtoni</i>
mgra	<i>Memecylon grande</i>	szey	<i>Shorea zeylanica</i>
mnag	<i>Mesua nagassarium</i>	T	Transpiration
mrev	<i>Memecylon revolutum</i>	TDM	Total dry mass
mzey	<i>Mangifera zeylanica</i>	TPL	Total palisade layer
P	Plasticity	uapi	<i>Urandra apicalis</i>
PAR	Photosynthetically Active Radiation	UE	Upper epidermis layer
pf	partial-sun	valt	<i>Vitex altissima</i>

# SHADE TOLERANCE RANKINGS OF RAIN FOREST TREE SEEDLINGS, SOUTHWEST OF SRILANKA

P. A. K. A. K. Panditharathna

## ABSTRACT

The tropical rain forest is considered a mosaic of patches in different stand development stages. It is necessary to know the nature of the light environments, in order to evaluate the responses of seedlings of species to a range of shade conditions. The present study examined forty-three species of eighteen tree families that exist in rain forest of southwest Sri Lanka. Species comprise canopy, sub canopy or understorey trees characterized as late successional and pioneer species, which are either site restricted or generalist species. Experiments were designed to investigate seedling performance of these species grown for two years within shade houses. Leaf morphological, physiological and anatomical attributes were measured in four different shade treatments (full-sun, partial-sun, partial-shade, deep-shade).

Results indicated that leaf physiological, anatomical, and morphological characteristics can be used to determine shade tolerance of a species. Canopy species had greater plasticity values of photosynthesis, stomatal conductance, specific leaf area, height increment, root collar diameter, total dry mass, leaf-mass ratio, and nitrogen-use efficiency than understorey species. Canopy topographic-generalists had greater plasticity values to changes in shade than canopy topographic-restricted species for stomatal conductance, specific leaf area, and thicknesses of leaf blade, palisade layer and upper epidermal layer.

Most shade tolerant species exhibited better growth under partial-shade and partial sun-than full-sun and deep-shade. The inter-relationships documented in this study, revealed a strong correlation exists between root mass ratio and leaf mass ratio, and between total dry mass and root collar diameter in canopy, understorey, canopy topographic-restricted and canopy topographic-generalist species. Canopy species showed strong correlation between specific leaf area and palisade layer thickness. Results from this study provide the ability to rank shade tolerance of each species.