# SEEDLING LEAF STRUCTURE OF SOME LATE-SUCCESSIONAL CANOPY TREE SPECIES IN SIMULATED LIGHT AND SOIL MOISTURE ENVIRONMENTS OF A SRI LANKAN RAIN FOREST.

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# ABSTRACT

**Seedling leaf-structure of some late-successional canopy tree species in simulated light and soil moisture environments of a Sri Lankan Rain Forest.**

Studies have shown leaf anatomy and morphology differs between tree species categorized as pioneers and late-successional, or sun-loving and shade-tolerant. Few studies have examined for changes in leaf structure among tree species considered to belong to the same ecological grouping (e.g.successional status,light tolerance); and no studies have investigated these changes within an ecological grouping that has been grown under different availability's of soil moisture. This study examined the variation in leaf structure among seedlings of four canopy tree species that have been characterized as late-successional and relatively shade-tolerant. Seedlings of *Dipterocarpus zeylanicus* Thw., *D.hispidus* Thw., *Mesua ferrea* L., and *M.nagassarium* (Burm.f) Kosterm., were grown for two years within replicated environmental shelters that had various light and soil moisture treatments. These treatments reflected the range of micro environments that have been observed within the mixed-dipterocarp forest of southwestern Sri Lanka. Three light treatments exposed seedlings to uniform diffuse light conditions that simulated amounts and qualities of radiation like that of

the forest understorey and forest edge (photon photosynthetic fluxes of 50,350,and 800 $\mu$mol $m^{-2}$ $s^{-1}$). Two treatments also exposed seedlings to amounts of direct radiation that were comparable to the centers of $100m^2$ and $400m^2$ canopy openings. A control treatment exposed seedlings to full open (2000 $\mu$mol $m^{-2}$ $s^{-1}$)conditions. For each light treatment seedlings were grown in either soil that was regularly watered to field capacity or soil that was consistently <30% of field capacity. At the end of two years leaf samples were taken for each species and light-soil moisture combination. Measures were made of leaf blade thickness, stomatal frequency, and thicknesses of upper epidermal, palisade mesophyll, and lower epidermal cell layers.

Significant differences in measures of leaf structure were shown among species and among the various treatments. In general all species showed leaf dimensions and cell layers increased with increase in amount of light and decrease in availability of soil moisture. Largest dimensions were therefore recorded from leaves exposed to full sun but grown in relatively dry soil. *M.ferrea* exhibited the thickest leaf blades followed by *M.nagassarium* *D.zeylanicus,* and lastly *D.hispidus*. *D.zeylanicus* had greater thicknesses of epidermal and palisade mesophyll layers than *M.ferrea*. This suggests that *M.ferrea* has a much thicker spongy mesophyll layer than the other species.

Unlike *Mesua*, both *Dipterocarpus* species exhibited double rows of cells within the palisade mesophyll and lower epidermal layers in certain treatments. This phenomenon increased in frequency with amount of light. Greatest densities of stomata were measured for *D.hispidus* followed in order by *M.ferrea, M.nagassarium* and *D.zeylanicus*. Difference in shade and drought tolerance among species in relation to site specialization is discussed.

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