

ONTOGENETIC AND SHADE-RELATED CHANGES IN LEAF CONSTRUCTION COST AND OTHER LEAF FUNCTIONAL TRAITS OF TWO TROPICAL FOREST SPECIES

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Plants' acclimation to light conditions in the environment at different ages can be elucidated through the concept of Leaf Construction Cost (LCC) and associated leaf functional traits. The LCC and a suite of leaf morphological and physiological traits; nitrogen, phosphorous, protein, ash contents, heat of combustion (Hc), efficiency of photosystem (Φ PSII), quantum yield (F_v/F_m), leaf mass per area (LMA), leaf dry matter content (LDMC), vein density (VD), and leaf thickness (LT) of two tropical forest species, *Terminalia arjuna*, *Madhuca longifolia* under three different heights (short, medium, tall), and ages (seedlings, saplings, mature) and two different light levels (30%, 100%) were evaluated. The study was conducted in a shade house at the Faculty of Agriculture, Rajarata University of Sri Lanka. The LMA ($p < 0.01$), LDMC ($p < 0.01$), and LCC ($p < 0.01$) were significantly low in saplings grown under 30% light conditions than in seedlings grown under 100% light conditions indicating that leaves in low light acclimate their light interception and photosynthetic rates. Seedlings that are grown under 100% light conditions have higher LT ($p < 0.01$) and VD ($p < 0.05$) than saplings grown under 30% light conditions. To reduce the investment cost on vascular tissues and maximise the growth rate, saplings produce thin leaves with shorter path length distances for transporting water. Mature plants had significantly low nitrogen, protein, and phosphorus contents, which may be due to presence of more dead tissues and slow growth rate. Significantly higher Φ PSII and F_v/F_m were recorded in mature trees indicating that they are acclimatised to resist photo inhibitory damage. A lower Hc ($p < 0.05$) and higher ash content ($p < 0.01$) resulted in lower LCC in saplings. In conclusion, leaf construction cost of these species closely follows low investment and high return resource strategy and plants allocate resources according to the functional needs during their ontogeny.

Keywords: Leaf mass per area, *Madhuca longifolia*, Nitrogen content, *Terminalia arjuna*, Vein density