Spectral and Thermal Comfort for Plants and People under Selected Shade Trees in Tropical Climate

Makuloluwa M.W.H.B.K. and Beneragama C.K.*
Department of Crop science,
Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka

Tropical regions receive great amount of solar radiation, affecting thermal energy increment. Shade trees play an essential role in changing microclimate by manipulating radiation energy that supports the survival of plants and people. This study compares the effectiveness of *Messua ferrea* L.*, Muntingia calabura* and *Amherstia nobilis* as shade trees in landscape planning related to shade creation, radiation modification, and microclimate modifications. In the present study, the transmittance spectrum was measured in the 318-885 nm region using a high-resolution spectroradiometer under the canopy of selected *Mesua, Muntingia* and *Amherstia* trees on bright sunny days. The change in shade casting on ground during the day was modeled. In addition, the temperature, CO_2 and relative humidity were also measured. The light transmittance was reduced when moving from the outer edge of the canopy to the trunk base in horizontal plane in selected tree species. The irradiance levels of blue (B: 400-5000 nm), red (R: 650-680 nm), far-red (FR: 700-885 nm) and ultra violet (UV: 318-400nm) components of the transmittance spectra under canopy were also found significantly low compared to direct sunlight. *Mesua* cuts down 99% of the total spectrum and *Muntingia* and *Amherstia* cut down the same by 92.1% and 97.1% respectively. The measured R: FR ratios that influence growth attributes of floricultural crops of *Mesua* were less than 0.1 and were 0.2 and 0.6 in *Amherstia* and *Muntingia,* respectively during the midday. Under the shaded canopy the temperature reduction was 2◦ C and 1◦ C in *Mesua* and *Muntingia,* respectively. *Mesua* showed 1-2% RH increment and ~20ppm reduction in the CO_2 concentration. There was no difference in RH under the tree canopy at midday in *Amherstia* and *Muntingia*. *Muntingia* was found to be suitable for growing shade-loving plants underneath their canopies and *Mesua* can be recommended for human comfort specially in public places.

Keywords: Landscaping, Microclimate, Radiation spectrum, Shade trees, Transmittance radiation

*chalindab@gmail.com