Thermal Acclimation Potential of Leaf Dark Respiration of Two Pioneer Seedling Species to Increase in Average Growth Temperature

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Land degradation is growing into a major problem of the 21st century, causing a number of social, economic, and environmental issues. Though such lands can be restored using pioneer species, their physiological traits responsible for acquiring higher net carbon gains under varying climatic conditions remain poorly studied. Thus, in this study two pioneer species, *Kenda* (*Macaranga peltate*) and *Dawul Kurundu* (*Neolitsesa cassia*) were grown at two average growth temperatures: 24.4±0.9 °C (low growth temperature), and 27.9±1.2 °C (high growth temperature), under field capacity (FC) and water stress conditions (50% of the available water), and their leaf respiration and thermal sensitivity (Q_{10}) of leaf respiration were quantified in the 25–40 °C temperature range. When measured at a common temperature (25 °C), both species grown at high growth temperature had significantly lower ($P< 0.05$) rates of leaf *R* than the same species grown at low growth temperature at FC, exhibiting acclimation of leaf respiration to high growth temperature and reducing carbon loss at high growth temperatures; however, no such difference was observed under water stress conditions. Further, the thermal sensitivity of leaf respiration (Q_{10}) decreased with increasing leaf temperature over the measurement range in both species at both growth temperatures and two soil moisture levels. Moreover, carbon loss occurs at a slower rate in response to increasing leaf temperature in both species grown at high growth temperatures, when compared to both species grown at low growth temperatures. Considering the thermal acclimation potential of leaf respiration, both species can be successfully used as high potential pioneer species for land restoration.

Keywords: Pioneer plant species, Respiration, Soil moisture, Temperature, Thermal acclimation

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