Effect of Increased Growth Temperature and Soil Moisture Stress on Chlorophyll Fluorescence in Two Pioneer Tree Seedlings Used in Land Restoration

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Chlorophyll measurements are frequently used in plant stress physiological investigations because they allow for the measurement of chlorophyll fluorescence from intact plants and improve understanding of potential alterations in leaf fluorescence features related to physiological condition. Pioneer tree species, which frequently encounter stress from the atmosphere's temperature and soil moisture, such in-depth knowledge is constrained. The most common early successional plant species are *Macaranga peltata* (*Kanda*) and *Neolitsea cassia* (*Dawul kurundu*), especially in the low country and mid country wet zone. Two pioneer plant species, *Kanda* and *Dawul Kurundu*, were grown at two thermal environments (26.0±0.2 ºC and 29±0.5 ºC) under field capacity (FC) and soil moisture stress condition (WS, i.e. 50% of the available water), and chlorophyll fluorescence in fully expanded recently mature leaves was measured at 28°C and 32°C, respectively, to examine how the above stress conditions alter the specific components of the higher proficiency. The results showed that at 32 ºC leaf temperature as compared to 28 ºC under water stressed conditions, water splitting activity was affected in both *Kanda* and *Dawul kurundu* plants. Furthermore, regardless of the water treatment, the maximum quantum yield of primary photochemistry significantly ($P<0.05$) reduced in both plants when leaf temperature increases from 28 ºC to 32 ºC. However, both plants showed a significant ($P<0.05$) decline in Performance Index at 32 ºC leaf temperature compared to 28 ºC under FC and WS conditions. *Kanda* and *Dawul kurundu* plants are particularly vulnerable to the combined effects of soil moisture and temperature stress when grown together. Chlorophyll fluorescence offers a thorough grasp of the fundamental phases of photosynthesis.

Keywords: Chlorophyll fluorescence, Restoration, Temperature

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