

## **Chlorophyll fluorescence transient analysis to probe photosynthesis performance of three *Plectranthus scutellarioides* (L.) R.Br (Coleus) varieties under two contrasting light conditions**

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### **Abstract**

Chlorophyll fluorescence transient measurement has proved a strong technique to investigate the photosynthesis functions and integrated measurement to identify the stress responses. This technique uses the energy flux theory in the photosynthesis apparatus. *Plectranthus scutellarioides* (L.) R.Br (coleus) is famous as a landscape plant and the appearance of this plant is determined by environmental factors, especially by light intensity. An experiment was conducted to assess the influence of two contrasting light conditions on photosynthesis activities of three *Plectranthus scutellarioides* (L.) R.Br (coleus) varieties through the chlorophyll fluorescence transient analysis measurements. Also there was an objective to assess the applicability of OJIP method for plant physiological analysis under stress conditions imposed by different light intensities. "Alabama sunset", "Velvet red", "Finger paint" varieties were arranged in 0% (Full sunlight) and 70% shade levels as two-factor factorial completely randomized design. Sixty days after exposure to 0% and 70% light conditions, chlorophyll fluorescence parameters were measured in fully expanded leaves using Hansatech pocket PEA chlorophyll fluorometer. Resulted values of OJIP transients were analyzed according to the JIP test and the most important functional parameters such as quantum efficiencies ( $\phi E_0$ ,  $\phi P_0$ ,  $\psi_0$ ) and Performance index ( $PI_{Abs}$ ). Analyzed data showed that from derived parameters,  $\phi E_0$ ,  $\phi P_0$ , quantum efficiencies and  $PI_{Abs}$  values were significantly affected by light conditions and varieties. Higher quantum efficiencies and the higher Performance index were observed under 70% shade compared to the 0% shade (full sunlight). Overall, the contrasting light conditions influence the photosynthesis performance of the coleus varieties and different parameters of OJIP chlorophyll fluorescence transient analysis can successfully be used to study the stress responses for different light intensities in the photosynthesis process.

**Keywords:** JIP- test, Performance index, Quantum efficiencies

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