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Chlorophyll Fluorescence as a Tool to Identify Drought Stress in *Acer* genotypes

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Highlights:

- Chlorophyll fluorescence response to drought/leaf dehydration is evaluated.
- Fluorescence transients, V_t , ΔW_{JO} , ΔW_{OK} are presented for drought/leaf dehydration.
- Similarities exist between drought and leaf dehydration rankings.
- Utilisation of the parameters PI_{ABS} , F_0/F_M and $V_0(Bo)$ is recommended.

Abstract: The effect of drought stress on continuous excitation chlorophyll fluorescence parameters and the OJIP transient is examined in cultivars of *Acer campestre*, *A. platanoides* and *A. pseudoplatanus*. Comparisons between whole tree level drought and desiccation of detached leaves under laboratory conditions is evaluated using both fluorescence parameters and differential kinetics. Data presented in this study suggests similarities exist between drought and desiccation. Chlorophyll fluorescence parameters which are both suitable and unsuitable at identifying drought stress are discussed and evaluated. New or uncommon fluorescence parameters and methods of analysis which may prove beneficial as drought detection tools are assessed. The over utilisation of the parameter F_v/F_m is also discussed. Results suggest utilisation of the parameters PI_{ABS} , F_0/F_m and $V_0(Bo)$ is recommended in preference to F_v/F_m , in studies aiming to identify drought stress in trees.

Key words: *Acer*, chlorophyll fluorescence, continuous excitation, drought, F_v/F_m , quantum efficiency.

Chlorophyll fluorescence (CF) is one of the most common methods used to measure and in some cases categorise a range of stressors impacting the photosynthetic processes (Maxwell

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