In Vivo Measurement of Plant Vitality by the Fluorescence Transient

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Abstract

The chlorophyll fluorescence combined with the O-J-I-P transients were examined in the leaves of the crinum plants (*Crinum asiaticum* var. *japonicum* BAK.), in order to satisfy the demand for rapid *in vivo* measurement of vitality, and to apply easily to approach questions of economical interest concerning the plant vitality. The photosynthetic efficiency, Fv/Fm, of crinum plants dramatically decreased depending on temperature drop in winter. In summer, the Fv/Fm values was lower in day time than at dawn and night, suggesting that photosynthetic efficiency is chronically photoinhibited in day time. In winter, there was no prominent diurnal fluctuations of Fv/Fm values. However, based on the O-J-I-P transient, PI_{No} and SFI_{No} dramatically increased at noon in summer, and $\psi o/(1-\psi o)$ diurnally fluctuated in winter. These results indicated that vitality indexes such as PI_{No}, SFI_{No} and $\psi o/(1-\psi o)$ can be used as the indicators for *in vivo* measurement of environmental stresses.