

Chlorophyll fluorescence kinetics and response of wheat (*Triticum aestivum* L.) under high temperature stress

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High temperature stress during grain filling period in wheat (*Triticum aestivum* L.) has pronounced effects on yield in major wheat growing agro-ecological zones. The fast chlorophyll fluorescence transients expose the damage to leaf photosynthetic activity under high temperatures. The method relies on the functioning of photosynthetic apparatus of plants under stress; however, these transients have been studied in detached leaves under controlled conditions. Still no reports are available on the potential usefulness of chlorophyll *a* fluorescence kinetics on intact wheat leaves for screening heat stress tolerant genotypes under field conditions. Hence, we conducted a study with the hypothesis that chlorophyll *a* fluorescence parameters and kinetics of plant-attached leaves under field conditions can be useful for screening of heat tolerant genotypes. The experimental population for testing the hypothesis consisted of 20 diverse wheat genotypes grown under timely and late sown environments (terminal heat stress) for two years. The results showed influence of high temperature on the expression of parameters F_o , F_v/F_o , F_v/F_m , and performance index. Analysis of the fast OJIP fluorescence transients indicated that the relative variable fluorescence between steps O and K and between steps O and J were related to high temperature stress tolerance. Five genotypes with consistent performance for better photosynthetic efficiency under thermal stress were observed. The inferences drawn from the present study supported our hypothesis that the analysis of chlorophyll *a* fluorescence transient parameters of plant attached leaves under field conditions can be used as a tool in the selection of wheat cultivars with better thermostability and functioning of photochemical reactions that could sustain photoassimilation and grain dry matter accumulation.

Keywords: Abiotic stress, Chlorophyll fluorescence, Elevated temperature, OJIP kinetics, Photosystem II, Fast chlorophyll fluorescence transients