# The Thermoluminescence 'Afterglow' Band as a Sensitive Indicator of Abiotic Stresses in Plants

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Single turn-over xenon flashes induce a thermoluminescence (TL) B-band centred near 35 °C. The far-red illumination of leaves at non-freezing temperatures induces a band peaking at around 45 °C (afterglow or AG-band), together with a downshifted B-band peaking between 15 °C and 28 °C. In control, unfrozen wheat plants, the $T_{max}$ of the B-band induced after 30 s far-red light at 0 °C was approx. 15–18 °C. In maize plants grown under the same conditions, this far-red-induced downshift was not so strong, since the B-band peaked at 28–30 °C. Both a decline in the AG-band and a reversal of the downshift of the B-band were observed after short-term freezing in several plant species. There was usually a sudden drop in the AG-band below a critical freezing temperature. However, while in wheat plants a weak TL emission could be seen between 40–50 °C in frozen samples, in cold-sensitive maize plants this was completely suppressed and only the B-band could be detected. In cold-hardened wheat plants the temperature at which the AG-band was suppressed was lower than in non-hardened plants. Drought and short-term heat stress also affect the AG-band. As the AG-band was found to be more sensitive to several types of stresses than the B-band, it can be used as a sensitive stress indicator. However, the behaviour of the AG-band depends on several factors (for example the age of the leaf, etc.), which must be controlled if different species or varieties are to be compared.