

CHLOROPHYLL FLUORESCENCE EMISSION AS A TOOL FOR INVESTIGATING THE PHOTOSYNTHETIC PERFORMANCE OF THE TOMATO *GREEN FLESH*, *LUTESCENT-2* MUTANTS AND THEIR COMBINATION

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chlorophyll fluorescence, tomato, green flesh, lutescent-2

Chlorophyll fluorescence emission in photosynthetic organisms is extensively utilised as indicator of photosynthetic activity. This technique allows to estimate, rapidly and non-invasively, the photochemical parameters such as the operating quantum efficiency of PSII (Fv/Fm), electron transport (ETR), photochemical (qP) and non-photochemical quenching (qN) related to CO₂ assimilation. Therefore, chlorophyll fluorescence has been frequently used for examining photosynthetic changes of different plant genotypes in controlled environment and field conditions.

The availability in tomato (*Solanum lycopersicum* L.) of a number of mutants controlling leaf and fruit colour allows to investigate how this mutations affect the efficiency of the photosynthetic apparatus of the plant. The *lutescent-2* (*l-2*) mutation determines early spot yellowing on adult leaves due to fotobleaching, imputable to the premature demolition of chlorophyll. On the contrary, the *green flesh* (*gf*) mutant exerts a stay-green leaf phenotype, but is an “aesthetic” mutant since, despite a chlorophyll content higher than the WT, a fraction of the green pigment is not functional. Both mutants result particularly useful for studying the senescence process of chloroplasts.

Plants of the cv. San Marzano background carrying either homozygous *l-2*, *gf* or the double mutation (*gf l-2/gf l-2*) were grown together with WT plants during spring-summer season in open field conditions. At the breaker stage, a sample of three leaves from three plants per genotype were harvested and analysed for chlorophyll and carotenoids content. At the same time a similar leaf sample was tested for differences in chlorophyll fluorescence emission.

The Fv/Fm values were significantly low for *l-2* and *gf l-2/gf l-2*, compared with the WT but not for the *gf*. Despite this result the *l-2* and the double mutant did not show any significant difference for ETR and qP compared with the WT. Since both ETR and qP are related to photosynthetic activity, the decrease observed for the *gf* mutant (almost 50%), suggests a reduction of the photosynthesis. However, an elevated content of chlorophyll was observed in the *gf*, confirming the non functionality of a fraction of the pigment.