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低温胁迫对茄子幼苗叶片叶绿素荧光特性和能量耗散的影响

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Effects of low temperature stress on chlorophyll fluorescence characteristics and excitation energy dissipation in eggplant seedling leaves

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摘要 以茄子幼苗为试材，研究了其在低温胁迫下叶绿素荧光参数的变化。结果表明，随着低温胁迫加剧，最大荧光（Fm）、PSII最大光化学效率（Fv/Fm）、PSII潜在活性（Fv/Fo）、PSII实际光化学效率（ΦPSII）和电子传递速率（ETR）、光化学荧光猝灭系数（qP）都表现出降低的趋势，初始荧光（Fo）、非光化学荧光猝灭系数（qN）上升；光化学反应的能量（P）在叶片所吸收的光能中所占的比例也逐渐减少，天线色素耗散的能量（D）和非光化学反应耗散的能量（E）表现出和P相反的趋势。茄子叶片ΦPSII及ETR对光强（PFD）的响应曲线表明，ΦPSII随PFD的升高而下降，低温下生长的叶片ΦPSII下降幅度较正常温度下的大；低温下生长叶片的电子传递速率的光饱和点低于正常生长的叶片，相应的饱和电子传递速率也较低。表明低温胁迫下，茄子幼苗PSII反应中心受到损伤，光合电子传递过程受到抑制。

关键词： 低温胁迫 茄子幼苗 叶绿素荧光参数 能量耗散 低温胁迫 茄子幼苗 叶绿素荧光参数 能量耗散

Abstract:

Effects of low temperature stress on chlorophyll fluorescence of eggplant（*Solanum melongena* L.） seedlings were investigated in this experiment. Results indicated that, as the treatment temperature decrease, several parameters including maximum fluorescence (Fm), photochemical maximum efficiency of PSII (Fv/Fm), potential photochemical efficiency (Fv/Fo), the electron transport rate (ETR), actual photochemical efficiency of PSII (ΦPSII), photochemical quenching coefficient (qP), were decreased, and the ration of absorbed light in photochemistry (P) was also decreased. At the same time, minimal fluorescence (Fo), non-photochemical quenching coefficient (qN) were increased, and the ratio of thermal dissipation (D) and excess energy (E) were also increased. The response curve of ΦPSII to light intensity demostrated when light intensity increased, ΦPSII responded in a quick decline way. Response curve of ETR to light intensity showed lower saturate electron transport rate and lower light saturation point on eggplant seedlings with low temperature stress. Results suggested that reaction center of PSII was damaged, and pathways of photosynthetic electron transport were inhibited in eggplant seedlings when exposed to the low temperature stress.

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