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研究报告

外源亚精胺对根际低氧胁迫下黄瓜幼苗光合作用的影响

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摘要 采用营养液水培法，研究了低氧胁迫下亚精胺(Spd)对黄瓜幼苗净光合速率（P_n）、细胞间隙CO_2浓度（C_i）、气孔导度（G_s）、蒸腾速率（T_r）以及量子效率（Φ_c）和羧化效率（CE）的影响.结果表明，低氧胁迫下，黄瓜植株P_n呈下降趋势，处理10 d后达最低值，为同期对照的63.33%，而低氧胁迫的外源Spd处理10 d时P_n升高了1.25倍；C_i与P_n呈一定负相关性（R^2=0.4730～0.7118），G_s与T_r的变化幅度较大，低氧胁迫下有明显下降趋势，Spd处理后其值有所上升，两者呈显著相关（R^2=0.7821～0.9458），但与P_n的相关性不显著；低氧下Φ_c和CE比对照分别下降了63.01%和72.33%，而Spd处理后，Φ_c和CE值分别提高了23%和14%.表明在低氧胁迫下黄瓜幼苗的光合抑制主要是由非气孔限制所引起的，而外源Spd可通过对光系统的修饰减轻黄瓜幼苗的低氧胁迫伤害.

关键词 低氧胁迫 外源多胺 光合作用 黄瓜

分类号

Effects of exogenous spermidine on *Cucumis sativus* L. seedlings photosynthesis under root zone hypoxia stress

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Abstract

With water culture, this paper studied the effects of exogenous spermidine (Spd) on the net photosynthetic rate (P_n), intercellular CO_2 concentrations (C_i), stomatal conductance (G_s), transpiration rate (T_r), apparent quantum yield (Φ_c), and carboxylation efficiency (CE) of cucumber seedlings under hypoxia stress. The results showed that the P_n decreased gradually under hypoxia stress, and reached the minimum 10 days after by 63.33% of the control. Compared with that of hypoxia-stressed plants, the P_n after 10 days application of exogenous Spd increased 1.25 times. A negative correlation (R^2=0.4730～0.7118) was found between P_n and C_i. G_s and T_r changed in wider ranges, which decreased under hypoxia-stress, but increased under hypoxia-stress plus exogenous Spd application. There was a significant positive correlation between G_s and T_r (R^2=0.7821～0.9458), but these two parameters had no significant correlation with P_n; Hypoxia stress induced a decrease of Φ_c and CE by 63.01% and 72.33%, respectively, while hypoxia stress plus exogenous Spd application made Φ_c and CE increase by 23% and 14%, respectively. The photo-inhibition of cucumber seedlings under hypoxia stress was mainly caused by non stomatal limitation, while exogenous Spd alleviated the hypoxia stress by repairing photosynthesis system.

Key words Hypoxia stress Exogenous spermidine Photosynthesis *Cucumis sativus* L.

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