应用生态学报 2006 17 (11): 2016-2019 ISSN: 1001-9332 CN: 21-1253/Q

研究报告

干旱胁迫对杨树光合生理指标的影响

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收稿日期 2005-12-23 修回日期 2006-8-24 网络版发布日期 接受日期

摘要 采用PEG模拟干旱胁迫的方法，利用气体交换法和叶绿素荧光技术，研究了干旱胁迫下小青杨（*Populus pseudo-simonii*）的光合生理变化. 结果表明, 干旱胁迫初期，小青杨的净光合速率(P_n)、蒸腾速率(T_r)、气孔导度(g_s)和胞间CO_2浓度(C_i)值均随干旱胁迫增强而下降，杨树P_n的下降主要是由于g_s下降引起的；干旱胁迫后期, C_i值逐渐升高，非气孔限制成为光合作用的主要限制因子. 干旱胁迫后期, PSⅡ原初光能转化效率(F_v/F_m)和PSⅡ潜在活性(F_v/F_o)明显下降，光抑制增强，光合电子传递受阻. POD酶的活性在胁迫初期升高，后期降低，说明干旱胁迫初期对保护系统酶活性升高有诱导作用，随着胁迫时间的延长，F_v/F_m和F_v/F_o降低，活性氧清除酶活性下降，活性氧代谢的平衡被打破，导致光合器官的伤害. 由此表明, 干旱胁迫后期P_n的降低与PSⅡ荧光参数及POD酶活性下降有关.

关键词 小青杨 干旱胁迫 光合生理 POD活性

分类号

Effects of drought stress on photosynthesis physiology of *Populus pseudo-simonii*

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Abstract

In this paper, the effects of drought stress simulated by PEG on the photosynthesis of *Populus pseudo-simonii* were monitored by gas exchange and chlorophyll fluorescence techniques. The results showed that in the early phase of drought stress, net photosynthetic rate (P_n), transpiration rate (T_r), stomata conductance (g_s), and intercellular CO_2 concentration (C_i) decreased with increasing stress, and the decrease of P_n was mainly related to the decreased g_s. In the late phase, C_i increased gradually, while F_v/F_m and F_v/F_o decreased significantly. POD activity increased in the early phase, but decreased in the late phase. All of these indicated that in the early phase of drought stress, stomata closure was the main factor limiting *P. pseudo-simonii* photosynthesis, while in the late phase, the main limiting factor was non-stomatal.A short period of drought stress to the stress resulted in the decrease of PSⅡ efficiency and POD activity.

Key words *Populus pseudo-simonii* Drought stress Photosynthesis physiology POD activity

DOI:

通讯作者