



三个不同耐高温棉花品系的光合特性及对盛花期高温胁迫的响应

熊格生¹, 袁小玲², 贺彭毅³, 田东洋², 葛瑞华², 刘 志^{2*}

1. 湖南农业大学科学技术师范学院, 长沙410128; 2. 湖南农业大学生物科学技术学院, 长沙410128; 3. 湖南农业大学农学院, 长沙410128)

Leaf Photosynthetic Characteristics and Response to High Temperature Stress at Peak Flowering Stage among Three Cotton Lines with Different Tolerance to High Temperature

XIONG Ge-sheng¹, YUAN Xiao-ling², HE Peng-yi³, TIAN Dong-yang², GE Rui-hua², LIU Zhi^{2*}

1. Normal College of Science and Technology, Hunan Agricultural University, Changsha 410128, China; 2. College of Bioscience and Biotechnology, Hunan Agricultural University, Changsha 410128, China; 3. College of Agronomy, Hunan Agricultural University, Changsha 410128, China

摘要

参考文献

相关文章

全文: PDF (686KB) HTML 1KB 导出: BibTeX or EndNote (RIS) 其它资料

摘要 对不同耐高温棉花品系叶片的光合特性及其在盛花期高温胁迫下的变化进行了比较研究。结果表明, 与敏感品系XYM 68和TS 18相比, 耐高温品系HLY从盛蕾期到结铃盛期的净光合速率、水分利用率、最大净光合速率和表观量子产率显著高于其它2个品系, 同时具有较低的光补偿点和较高的光饱和点, 而在气孔导度、胞间CO₂浓度、蒸腾速率和气孔限制值上没有显著差异。盛花期高温胁迫降低了净光合速率、气孔导度和水分利用效率, 增强了蒸腾速率和气孔限制值, 而对胞间CO₂浓度没有明显影响; 与处理前相比, 敏感品系XYM 68和TS 18的净光合速率下降显著, 气孔导度的降低幅度显著大于HLY, 而蒸腾速率增加的强度却显著低于HLY。高温胁迫下, 光系统II的最大光化学效率、量子产量和光化学猝灭系数下降, 而非光化学猝灭系数增加; 3个不同耐高温品系中, TS 18的最大光化学效率减少显著, XYM 68和TS 18的量子产量、光化学猝灭系数降幅显著高于HLY, 而非光化学猝灭系数的增加量却显著低于HLY。

关键词: 棉花 高温耐性 光合特性 叶绿素荧光

Abstract: The leaf photosynthetic characteristics and their response to high temperature stress at peak flowering stage were analyzed comparatively among three cotton lines with different high-temperature tolerance in the paper. The results showed that the tolerant line HLY had significant higher net photosynthetic rate (P_n), water use efficiency (WUE), maximum net photosynthetic rate (P_{max}), and apparent quantum yield, also had lower light compensation point (LCP) and larger light saturation point (LSP) as compared with those of the sensitive lines XYM 68 and TS 18 from peak squaring to boll-setting stage, but the stomatal conductance (G_s), intercellular CO₂ concentration (C_i), transpiration rate (T_r), and stomatal limitation (L_s) did not differ significantly among the three cotton lines. High temperature stress at peak flowering stage caused a decline in P_n , G_s and WUE, and an increase in T_r and L_s , but did not affect C_i . The P_n in XYM 68 and TS 18, but not in HLY, reduced significantly after being stressed. The decrease of G_s was higher, whereas the increase of T_r was lower in XYM 68 and TS 18 than those in HLY. The maximum photochemical efficiency of photosystem II (F_v/F_m), the quantum yield of electron transport ($\Phi_{PS II}$), and the photochemical quenching co-efficient (qP) reduced, and accompanied by an increase in the non-photochemical quenching co-efficient (NPQ) under high temperature stress at peak flowering stage. Among the three cotton lines, the F_v/F_m in TS 18 declined dramatically, the reduction of $\Phi_{PS II}$ and qP was higher, and the increase of NPQ was significantly lower in XYM 68 and TS 18 than those in HLY.

Keywords: cotton high temperature tolerance photosynthetic characteristics chlorophyll fluorescence

收稿日期: 2010-07-30;

基金资助:

国家自然科学基金项目 (30900909); 湖南省教育厅优秀青年科研项目 (08B033); 湖南省科技计划项目 (2009NK3101)

通讯作者: tigerzhiliu@yahoo.com.cn

作者介绍: 熊格生 (1967-), 男, 博士, 副教授

引用本文:

熊格生, 袁小玲, 贺彭毅, 田东洋, 葛瑞华, 刘 志. 三个不同耐高温棉花品系的光合特性及对盛花期高温胁迫的响应[J]. 棉花学报, 2011, 23(2): 106-112.

XIONG Ge-Sheng, YUAN Xiao-Ling, HE Peng-Yi, TIAN Dong-Yang, GE Rui-Hua, LIU Zhi. Leaf Photosynthetic Characteristics and Response to High Temperature Stress at Peak Flowering Stage among Three Cotton Lines with Different Tolerance to High Temperature[J]. Cotton Science, 2011, 23(2): 106-112.

链接本文:

Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

作者相关文章

- ▶ 熊格生
- ▶ 袁小玲
- ▶ 贺彭毅
- ▶ 田东洋
- ▶ 葛瑞华
- ▶ 刘 志

