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NaCl胁迫对棉花叶片衰老特征的影响及其生理学机制

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The Effects of NaCl Stress on Cotton Leaf Senescence Characteristics and Physiological Mechanisms

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摘要 以叶片衰老快慢不同的两个棉花品系L21和L22为材料, 研究了NaCl胁迫对棉花叶片衰老的影响及其相应的生理学机制。室内水培棉苗, 待第5片真叶展开20 d后用含125 mmol·L⁻¹ NaCl的营养液处理棉苗, 以不含NaCl的营养液处理为对照。结果显示, NaCl胁迫下L21和L22叶片中叶绿素含量和光合作用速率下降, 叶片和根中的Na⁺含量上升、K⁺含量降低; NaCl胁迫还增加了棉株体内脱落酸(ABA)含量、降低了玉米素核苷(ZR)含量。表明K⁺含量降低以及ABA含量升高、ZR含量下降是NaCl胁迫促进棉花叶片衰老的重要原因。

关键词: 棉花 NaCl胁迫 衰老 激素

Abstract: Salt stress can induce cotton leaf senescence, but the underlying mechanism is not clear. Early (L21) and late (L22) senescence cotton varieties were subjected to NaCl stress, and effects of this stress on leaf senescence and underlying mechanisms were examined. Cotton seedlings were grown in solution culture in a greenhouse. Uniform seedlings of the two varieties were treated with a solution containing 125 mmol·L⁻¹ NaCl 20 days after the fifth mainstem leaf emerged, while those with a NaCl-free solution were used as controls. The content of leaf chlorophyll (Chl), leaf photosynthetic (Pn) rate, concentrations of Na⁺, K⁺ and some endogenous hormones either in the fifth mainstem leaves or roots were determined at a 7-d interval after salt stress. Compared to NaCl-free controls, Pn rate and Chl content in the mainstem leaves of the two varieties greatly decreased after salt stress, indicating that such stress enhanced leaf senescence. Salt stress also increased Na⁺ content but reduced K⁺ content. Concentrations of abscisic acid (ABA) increased but zeatin riboside (ZR) decreased in both leaves and roots in L21 and L22 after salt stress. This suggests that accelerated leaf senescence of cotton can be attributed to reduced accumulation of K⁺ and cytokinins but increased ABA concentration under salt stress.

Keywords: cotton NaCl stress leaf senescence endogenous hormones

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