

研究论文

UV-B辐射和NaCl胁迫对绿豆幼苗叶片DNA损伤的复合效应

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摘要 研究了0.4 W/m² UV-B辐射和0.4% NaCl胁迫对两绿豆品种中绿-1和秦豆-20 (*Phaseolus raditus* L. cv. Zhonglü-1 and Qindou-20) 幼苗叶片DNA损伤的复合效应。结果表明: (1) 中绿-1抗UV-B辐射和NaCl胁迫的能力均强于秦豆-20; NaCl胁迫能降低中绿-1 UV-B敏感性, 但对秦豆-20 UV-B敏感性无明显影响。(2) 两逆境因子单独胁迫或复合胁迫下DNA增色效应均明显降低, 但中绿-1降低程度小于秦豆-20, 复合胁迫下降低程度小于单独NaCl胁迫下。(3) UV-B辐射诱导的中绿-1 DNA链内环丁烷嘧啶二聚体(CPD)累积量明显低于秦豆-20; NaCl胁迫能降低UV-B诱导的中绿-1 CPD累积, 而对UV-B诱导的秦豆-20 CPD累积无影响。(4) 各种胁迫处理均导致两品种幼苗DNA含量降低, 但两品种间相比中绿-1降低程度较大。结果说明UV-B辐射不仅能诱导DNA链内交联形成CPD, 而且能诱导DNA链间交联和DNA含量降低, 且不同绿豆品种或同一品种在有NaCl胁迫时UV-B敏感性的差异主要与CPD累积量和DNA链间交联程度有关。

关键词 UV-B辐射; NaCl 胁迫; 绿豆幼苗; DNA链间交联; 环丁烷嘧啶二聚体累积

分类号 Q143, Q948, X171

Interaction of UV-B and NaCl on DNA damage of mung bean

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Abstract The interactive effect of 0.4 W/m² UV-B radiation and 0.4% NaCl stress on DNA in the primary leaves of two mung bean cultivars (*Phaseolus raditus* L. cv. Zhonglü-1 and Qindou-20) was studied. The results showed that (1) mung bean cultivar "Zhonglü-1" is more tolerant to both UV-B radiation and NaCl stress than cultivar "Qindou-20". NaCl stress reduced UV-B sensitivity of "Zhonglü-1", but did not change UV-B sensitivity of "Qindou-20". (2) Treatment of the two cultivars by either UV-B or NaCl alone or by both stresses together resulted in a decrease in DNA hyperchromicity in the two mung bean cultivars. The extent of the decrease in cultivar "Zhonglü-1" was lower than that in cultivar "Qindou-20". Decrease in DNA hyperchromicity in the two mung bean cultivars under both UV-B and NaCl stresses together was lower than that under NaCl stress alone. (3) UV-B-induced cyclobutyl pyrimidine dimers (CPD) accumulation in cultivar "Zhonglü-1" was lower than that in cultivar "Qindou-20"; NaCl stress could reduce the UV-B-induced CPD accumulation in cultivar "Zhonglü-1", but did not change that in cultivar "Qindou-20". (4) All stress treatments caused a drop of DNA content in two mung bean cultivars but with cultivar "Zhonglü-1" showing stronger responses. These results indicate that UV-B radiation can induce not only the formation of CPD on the same DNA strand, but also the formation of cross-linking between the two strands of DNA and the decrease in DNA content. It is also suggested that the different UV-B sensitivity between two mung bean cultivars under either NaCl stress or no NaCl stress might be mainly caused by the differences in CPD accumulation and cross-linking between the two strands of DNA.

Key words litter decomposition, N and P dynamics, accumulate, release, marsh, Sanjiang Plain

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