



外源一氧化氮对棉花种子吸胀期间耐冷性和发芽能力的影响

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Effect of Exogenous Nitric Oxide on Chilling Tolerance and Seed Germination of Cotton Seed during Seed Imbibition

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摘要

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摘要 选用对温度敏感性不同的棉花品种为试验材料, 研究外源一氧化氮供体硝普钠 (SNP) 对棉花种子吸胀期间的耐冷性及发芽力的影响。结果表明, 一氧化氮引发处理棉花种子, 能提高低温胁迫期间胚内过氧化物酶 (POD)、过氧化氢酶 (CAT)、超氧化物歧化酶 (SOD) 和抗坏血酸过氧化物酶 (APX) 活性, 以及可溶性蛋白质和脯氨酸 (Pro) 含量, 降低了相对电导率及丙二醛 (MDA) 含量, 同时显著提高发芽率, 并显著缩短发芽时间。低温吸胀48 h后, 与对照相比, SNP处理后种子的发芽率平均提高29.85%, 发芽时间平均缩短3 d。因此, 一氧化氮处理能提高棉花种子吸胀期间的耐冷性, 提高低温胁迫下种子发芽能力。

关键词: 一氧化氮 低温胁迫 抗氧化酶 发芽 棉花

Abstract: Cotton varieties with different temperature sensitivities were used to explore the effect of the exogenous nitric oxide donor sodium nitroprusside (SNP) on chilling tolerance and germinability of cotton seed during the imbibition period. The results showed that, under low temperature stress, nitric oxide treatment increased activities of peroxidase (POD), catalase (CAT), superoxide dismutase (SOD), ascorbate peroxidase (APX), and soluble protein and proline (Pro) contents, and decreased the relative conductivity and malondialdehyde (MDA) content in the embryo of cotton seed. The nitric oxide treatment also significantly increased the average germination rate and shortened the germination time. After 48 h of seed imbibition at low temperature, the germination rate was increased by 29.85% and the germination time was decreased by 3 d in the SNP treatment compared with the control. These results indicate that nitric oxide treatment can improve the chilling tolerance during the seed imbibition period and enhance seed germination ability.

Keywords: nitric oxide chilling stress antioxidant enzyme germination cotton

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