



盐分胁迫下2-氯-6-(三氯甲基)吡啶浸种对棉种发芽及其生理特性的影响

陶 瑞, 刘 涛, 褚贵新*

石河子大学农学院/新疆生产建设兵团绿洲生态农业重点实验室, 石河子832003

Effects of Nitrapyrin Soaking on Cotton Germination Rate and Its Salt Resistant Physiological Characteristics

TAO Rui, LIU Tao, CHU Gui-Xin**

Department of Resources and Environmental Science, Agronomy College, Shihezi University / Key Laboratory of Oasis Construction Corps, Shihezi, Xinjiang 832003, China

摘要

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摘要 通过设置0、80、120 mmol·L⁻¹ 3种NaCl浓度,研究了3种盐分水平下2-氯-6-(三氯甲基)吡啶浸种对棉种发芽的影响,分别测定了发芽过程中可溶性蛋白、可溶性糖、抗氧化酶及丙二醛含量对2-氯-6-(三氯甲基)吡啶浸种的生理响应。结果表明,盐分胁迫显著抑制棉种发芽,而2-氯-6-(三氯甲基)吡啶浸种能明显减轻盐分胁迫对种子发芽的抑制。在3个盐分水平(0、80、120 mmol·L⁻¹)下,2-氯-6-(三氯甲基)吡啶浸种处理的发芽率、发芽势及种子活力指数均比清水浸种有显著提高,其增幅分别为11.5%~58.4%、16.8%~65.0%和82.5%;同时,2-氯-6-(三氯甲基)吡啶浸种可显著提高棉种SOD、POD、CAT的活性,分别比清水浸种增加了57.2%~282.7%、139.3%和6.4%~15.1%,且显著降低了电解质外渗率与MDA含量。在盐分胁迫下,利用4.1×10⁻³ mmol·L⁻¹的2-氯-6-(三氯甲基)吡啶浸种可提高棉种抗氧化酶活性,促进其萌发过程中可溶性有机物的转化,显著提高棉种发芽率和发芽势。

关键词: 2-氯-6-(三氯甲基)吡啶 盐分胁迫 棉种 发芽率 酶活性

Abstract: A stimulation experiment was carried out to investigate the effect of nitrapyrin soaking of cotton seed on cotton germination rate under different salt stress conditions(0, 80, 120 mmol·L⁻¹ NaCl). Meanwhile, cotton seed enzyme activities of antioxidase and contents of seed water-soluble sugar, water-soluble protein, antioxidant enzyme malondialdehyde (MDA) in cotton seed were measured during the cotton seed germination process. An obvious inhibition effect on cotton seed germination was observed under salt stress; but nitrapyrin soaking treatment significantly increased cotton seed germination rates, germination potential, and cotton seed vigor index. Compared with water soaking treatment, germination rate increased by 11.5%~58.4%, germination potential increased by 16.8%~65.0% and cotton seed vigor index increased by 42.9%~82.5% when using nitrapyrin soaking treatment at same salt concentration level, indicating nitrapyrin soaking plays a significant role on alleviating the salt inhibition effect on cotton seed germination. Nitrapyrin soaking treatments statistically increased cotton seed enzyme activities. Compared with water soaking treatment, enzyme activities of SOD, POD, CAT increased by 57.2%~282.7%, 8.3%~139.3% and 6.4%~15.1% with nitrapyrin soaking treatments at the same salt concentration level, respectively. Furthermore, seed electrolyte leakage rate and MDA content of nitrapyrin soaking were lower than that of the water soaking treatment, and the nitrapyrin soaking treatment markedly increased water soluble organic substance content in cotton seed, namely, there has a significant effect of nitrapyrin soaking on promotion of complex organic substances transformed to water soluble organic substances during the germination process. In conclusion, through 4.1×10⁻³ mmol·L⁻¹ 2-chloro-6-(trichloromethyl) pyridine soaking exert a significant effect on increasing cotton seed germination rate, promoting its salt resistant physiological characteristics under salt stress conditions.

Keywords: 2-chloro-6-(trichloromethyl) pyridine salt stress cotton seed germination rate enzyme activity

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Corresponding Authors: chuguixinshzu@163.com