

外源NO对不同作物种子萌发、幼苗生长及抗氧化酶活性的影响

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Effects of exogenous nitric oxide on seed germination, seedling growth and antioxidant enzyme activities of several plant species

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摘要

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摘要 以浓度分别为0、0.01、0.1、1.0 mmol/L的硝普钠 (Sodium nitroprusside, SNP; NO供体) 处理玉米、小麦、花生、小白菜、萝卜、黄瓜的种子和幼苗, 研究了以上几种浓度的SNP对作物种子萌发和幼苗生长及抗氧化酶活性的影响。结果表明: SNP对多数种子萌发影响表现为低浓度 (0.01 mmol/L和0.1 mmol/L) 促进, 高浓度 (1.0 mmol/L) 抑制, 其中对萝卜发芽率的促进作用最显著; 低浓度SNP可有效促进植物幼苗地上部的生长, 其中对小麦、黄瓜的促进效果最显著, 同时可显著促进根系的伸长, 其中对萝卜的促进效果最显著, 且对植物幼苗生长的影响与作物种类有关; SNP对多数植物的根系活力有明显的促进作用, 其中对萝卜的促进效果最显著; 适宜浓度的SNP可以提高作物CAT、POD和SOD活性以及可溶性蛋白含量, 并降低MDA含量, 不同作物SNP的适宜浓度不同, 其中0.1 mmol/L SNP对多数作物处理效果最好。

关键词: 一氧化氮 硝普钠 种子萌发 幼苗生长 抗氧化酶

Abstract: Nitric oxide (NO) plays an important role in growth and development of plants. In this study, Sodium nitroprusside (SNP) is used as NO donor to examine the effects of NO on seed germination, seedling growth and activities of antioxidant enzymes of maize, wheat, peanut, pakchoi, radish and cucumber. The results show that the low concentrations (0.01 and 0.1 mmol/L) of SNP could promote the germination viability and germination percentage of seeds, while the high concentration (1.0 mmol/L) of SNP inhibits seed germination, and the effects on radish are the most obvious. The low concentrations of SNP promotes the growth of shoot significantly, and the effects on wheat and cucumber are the most obvious. The low concentrations also promotes the growth of root, and the effects on radish are the most obvious. The effects of SNP on seedling growth maybe related to the plant species. SNP could promote the root activities of most plants, the effects on radish are the most obvious. Suitable SNP concentration also enhances the activities of CAT, POD and SOD and the content of soluble protein, but declines the content of MDA. The optimal SNP concentration differs with different plants. In addition, the proper concentration for most plants is 0.1 mmol/L under the experimental conditions.

Keywords: nitric oxide (NO) sodium nitroprusside (SNP) seed germination seedling growth antioxidant enzyme

收稿日期 2011-07-06; 接受日期 2012-02-27

基金名称:

“十二五”国家科技支撑计划项目; 国家“948”项目

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引用本文:

张秀玮 董元杰 邱现奎 王全辉 王艳华 胡国庆. 外源NO对不同作物种子萌发、幼苗生长及抗氧化酶活性的影响[J] 植物营养与肥料学报, 2012, 18(2): 397-404

ZHANG Xiu-wei DONG Yuan-jie QIU Xian-kui WANG Quan-hui WANG Yan-hua HU Guo-qing. Effects of exogenous nitric oxide on seed germination, seedling growth and antioxidant enzyme activities of several plant species[J] Acta Metallurgica Sinica, 2012, 18(2): 397-404

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