

增硝营养对不同基因型水稻苗期硝酸还原酶活性及其表达量的影响

曹云; 范晓荣; 孙淑斌; 徐国华; 沈其荣; 狄廷君

南京农业大学资源与环境科学学院 江苏南京210095

Effect of partial replacement of NH₄⁺ by NO₃⁻ on nitrate reductase activity and their genetic expression patterns in rice

CAO Yun; FAN Xiao-rong; SUN Shu-bin; XU Guo-hua; SHEN Qi-rong; DI Tin-jun*

College of Resources and Environmental Sciences; Nanjing Agriculture University; Nanjing 210095; China

摘要

参考文献

相关文章

Download: [PDF \(671KB\)](#) [HTML 0KB](#) Export: [BibTeX](#) or [EndNote \(RIS\)](#) [Supporting Info](#)

摘要 利用控制条件下的溶液培养方法,研究了增硝营养(NH₄⁺: NO₃⁻比例为100: 0和50: 50)对两种不同的基因型水稻南光和云梗苗期生长和硝酸还原酶(NR)活性及基因表达量的影响。结果表明,不同基因型水稻在增NO₃⁻营养下生物量、氮素含量、氮积累量的增幅南光大于云梗。NO₃⁻的存在增强了水稻硝酸还原酶的活力和NR基因*OsNia1*、*OsNia2*的表达。不同基因在水稻幼苗中,两个品种*OsNia2*的相对表达量均高于*OsNia1*。就品种而言,无论叶片还是根系,增硝后南光*OsNia2*mRNA表达量都高于云梗;南光叶片*OsNia1*mRNA表达量也较云梗叶片高。增硝营养提高了水稻NR基因的表达,增加了NR活性,促进了水稻NO₃⁻的同化利用,从而增加了氮素在植株地上部的积累同化。南光和云梗相比,前者对NO₃⁻的响应更为强烈。

关键词: 增硝营养 水稻 硝酸还原酶 相对表达量 增硝营养 水稻 硝酸还原酶 相对表达量

Abstract: Nitrogen is one of the most important nutrients limiting the production of cereal crops. There has been increased evidence that nitrate(NO₃⁻) had an enhanced effect on rice production although it prefers ammonium(NH₄⁺) nutrition. Furthermore, rice is being increasingly cultivated in the soil intermittently irrigated or even in aerobic soil condition in China. Thus, nitrate plays a more remarkable role than ever before. Hydroponic experiments were carried out to study the effects of partial replacement of NH₄⁺ by NO₃⁻ on the growth, nitrogen(N) accumulation, nitrate concentration, nitrate reductase(NR) activity and expression patterns of two rice (*Oryza sativa* L.) NR genes, i.e. *OsNia1*, *OsNia2* in two cultivars (Nanguang and Yunjing) at the seedling stage (35-day-old) under control conditions. The results obtained were as follows. Both rice cultivars growing in mixed N supply achieved a maximum biomass. NO₃⁻ supply could increase the biomass of rice shoots and roots on average by about 23% and 18%, respectively. Total N accumulation in Nanguang and Yunjing applying mixed N sources (NH₄⁺ and NO₃⁻) was 18% and 8% higher than those single applying NH₄⁺. RT-PCR analysis of different samples revealed that transcript levels of *OsNia1*, *OsNia2* increased in response to mixed N supply. The transcript level of *OsNia2* was significantly higher than *OsNia1* in both rice cultivars tested. Nanguang responses to NO₃⁻ in a greater way that the transcript levels of *OsNia2* both in leaves and roots and *OsNia1* transcripts in leaves were higher than Yunjing. NR activities of both in leaves and roots of Nanguang were more significantly promoted than Yunjing fed with NH₄NO₃. The high activity of NR [NO₂ 67 μmol/(g·h)] showed that rice was also efficient in absorbing and assimilating NO₃⁻. The more efficient inorganic N assimilation resulted in an improved growth of rice. In conclusion, rice, like many plants, supplied with mixed N have a beneficial effect on crop growth NO₃⁻. Therefore, promoting nitrification to a certain extent in paddy soil is of great significance for rice production.

Keywords:

引用本文:

曹云; 范晓荣; 孙淑斌; 徐国华; 沈其荣; 狄廷君. 增硝营养对不同基因型水稻苗期硝酸还原酶活性及其表达量的影响[J] 植物营养与肥料学报, 2007, V13(1): 99-

CAO Yun; FAN Xiao-rong; SUN Shu-bin; XU Guo-hua; SHEN Qi-rong; DI Tin-jun. Effect of partial replacement of NH₄⁺ by NO₃⁻ on nitrate reductase activity and their genetic expression patterns in rice[J] Acta Metallurgica Sinica, 2007, V13(1): 99-

Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

作者相关文章