

控释氮肥对水稻秧苗形态特征和生理特性的影响

1 国家缓控释肥工程技术研究中心, 作物生物学国家重点实验室, 山东农业大学资源与环境学院, 山东泰安 271018; 2 山东金正大生态工程有限公司, 临沂 276700; 3 上海化工研究院, 上海 20006

Effects of controlled-release urea on morphological characteristics and physiological traits of rice seedlings

1 National Engineering Research Center for Slow/Controlled Release Fertilizers/State Key Laboratory of Crop Biology, College of Resources and Environment/Shandong Agricultural University, Taian, Shandong 271018, China; 2 Shandong Kingenta Ecological Engineering Co., Ltd, Linshu, Shandong 276700, China; 3 Shanghai Research Institute of Chemical Industry, Shanghai 200062, China

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摘要 通过种肥接触水稻育苗试验, 比较秧苗叶片中几种酶活性和激素含量, 探明接触性施肥提高肥料利用率的效应和机理, 以确定控释肥在水稻育苗上的最佳施用量和施用方法。研究表明, 水稻种子与大量控释氮肥接触的条件下仍能安全萌发, 且用量为800 g/盘和1000 g/盘时能够明显促进水稻秧苗的生长发育; 在同等施肥量的条件下, 肥料在种子下方接触施用的方法最有利于秧苗的生长; 控释氮肥用量为800 g/盘和1000 g/盘时, 秧苗叶片中的超氧化物歧化酶(SOD)、过氧化氢酶(CAT)和抗坏血酸-过氧化物酶(AsA-POD)活性高于常规尿素处理, 而丙二醛(MDA)含量则低于常规尿素处理, 这有利于促进水稻秧苗的生长; 控释氮肥用量为1200 g/盘时, 会导致叶片内的SOD、CAT和AsA-POD活性明显降低和MDA含量的相对增加; 随控释氮肥用量的增加, 秧苗叶片生长素(IAA)逐渐增加, 但当达到1200 g/盘时, IAA含量突然增加; 另外, 氮素缺乏和过多都会诱导秧苗体内脱落酸(ABA)含量明显增加而不利于秧苗正常生长。

关键词: 控释氮肥 接触施肥 水稻秧苗

Abstract: In order to determine the appropriate amount of controlled release urea(CRU)and the best application method, the mechanism of controlled release urea on enhancing the nitrogen use efficiency were investigated by conducting the experiment of the rice seeds and total CRU particles one time contacted application methods during the beginning of rice nursery stage. The results showed that the rice seeds fertilized by coexistence placement of a large amount of CRU particles germinated without any damage, and the rice seedlings grow very well with the CRU application rate of 800 g/box and 1000 g/box. With these two application rate, the best placement position the CRU particles was just below the rice seeds in which the CRU particles and the seeds contacted each other during the rice seed germination and the seedling growth. With these two application rate, the POD, CAT and AsA-POD enzyme activity of the rice seedling leaves were higher and the content of MDA was lower than that of conventional urea treatment, which were propitious to the rice seedlings growth. However, when the CRU application rate was 1200 g/box, the POD、CAT and AsA-POD enzyme activity were lower and also the content of MDA was higher than that of conventional urea treatment, which would retard the growth of rice seedlings. The IAA content in the rice seedling leaves was increased with the increase of CRU application rate and the IAA content was increased sharply when the CRU application rate was increased to 1200 g/box. In addition, the high ABA content induced by deficiency or superabundant of the nitrogen in the leaves would retard the growth of the rice seedlings.

Keywords: controlled-release urea coexistence placement rice seedlings

Received 2009-12-08; published 2010-03-09

Fund:

“十一五”国家科技支撑计划项目(2006BAD10B07); 山东省科技攻关项目(2009GG10006002); 山东省自然科学基金项目(Y2008.D29); 金正大研究基金项目(33299)资助。

引用本文:

杨越超1, 张民1*, 陈剑秋2, 段路路3, 耿毓清1, 郑磊2.控释氮肥对水稻秧苗形态特征和生理特性的影响[J] 植物营养与肥料学报, 2010,V16(5): 1126-1135

YANG Yue-Chao1, ZHANG Min 1*, CHEN Jian-Qiu2, Duan Lu-Lu3, Geng Yu-Qing1, Zheng Lei2.Effects of controlled-release urea on morphological characteristics and physiological traits of rice seedlings[J] Acta Metallurgica Sinica, 2010,V16(5): 1126-1135

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