

农业基础科学

基于15N示踪的施肥量与氮素含量变化规律的研究

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摘要:

【研究目的】本文研究水稻叶片全氮含量、15N丰度的变化以及与施氮水平之间的关系; 【方法】以临稻11, 圣稻13和阳光200三个水稻品种为材料, 进行盆栽实验; 【结果】结果表明, 不同生育期水稻叶片全氮含量和15N丰度均随施氮水平逐渐增加。顶1叶片全氮含量和施肥量仅在拔节期极显著相关性, 但是3个叶位15N丰度在全生育期与施氮量均达到0.01水平极显著相关。三个水稻品种不同叶位全氮含量随着施氮水平的提高总体呈现增加趋势; 15N示踪表明拔节期低氮素水平下位叶片15N丰度较上位高; 在高氮素水平上位叶片15N丰度增加; 孕穗期上位叶的氮素大量转移到穗部, 导致孕穗期上位叶的15N丰度明显小于下叶位; 抽穗期和灌浆期由于氮素营养的运转, 下叶位15N丰度明显小于上位叶。【结论】叶片15N丰度的变化更能反映出肥料供应的差异状况。和叶片全氮含量比较, 叶片15N丰度与施氮肥量的相关性更能说明施氮肥量和叶片氮素营养的关系。

关键词: 水稻 全氮含量 15N丰度

Studies on Varieties of Leaf 15N Abundance and Nitrogen Concentration in Rice

Abstract:

A series of potted experiments were conducted with three rice cultivars (Lindao11, Shengdao13 and Yangguang200) to investigate the relationships between rates of fertilization and leaf nitrogen concentration (including 15N abundance and total nitrogen). The results showed that leaf nitrogen concentration and 15N abundance were sensitive to increased nitrogen supply. The relationships between leaf nitrogen concentrations and the rates of fertilization indicated that the 1st leaf total nitrogen concentrations significantly correlated with the rates of fertilization just at jointing stage. However 15N abundance of the 1st, 2nd and 3rd leaf were significantly correlated with the rates of fertilization at 0.01 level during whole growth stages. The nitrogen concentration were the highest at jointing stage, and those were the lowest at milky stage, but nitrogen concentration differed among heading stage and booting stage not in a big way. 15N tracer method showed that the 15N abundance in lower leaf were higher than that in upper leaf at the low rates of fertilization and 15N abundance increased at high rates of fertilization at jointing stage. But nitrogen transferred to the fringe from the 1st leaf, as a result 15N abundance in upper leaf reduced at booting stage. With nitrogen transfer from lower leaves to upper leaves at heading and milky stages, 15N abundance in lower leaf were distinctively less than in the upper leaf. The 15N abundance change can reflect the difference condition of fertilizer supply. The correlation between 15N abundance and nitrogenous fertilizer quantity is better to show relations between nitrogenous fertilizer quantity and nitrogen nutrition.

Keywords: rice, nitrogen concentration, 15N abundance

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