

农学—研究报告

施氮水平对优质稻产量、品质及稻米Hg、As、Cd含量的影响

滕斌<sup>1</sup>,李之林<sup>2</sup>,肖立中<sup>2</sup>,张瑛<sup>3</sup>,吴敬德<sup>4</sup>,朱学桂<sup>1</sup>,宣红<sup>5</sup>

- 1. 安徽省农业科学院水稻研究所
- 2. 华南农业大学
- 3.
- 4. 安徽省农业科学院
- 5. 安徽省农科院水稻研究所

摘要:

以优质稻桂小占为材料,通过田间小区试验的方法,研究了空白,低肥(75 kg/hm<sup>2</sup>)、中肥(150 kg/hm<sup>2</sup>)、高肥(225 kg/hm<sup>2</sup>)4种施氮量对水稻产量、稻米品质和食用安全性(稻米Hg、As、Cd含量)的影响。结果表明,当施氮量低于150 kg/hm<sup>2</sup>时,随着施氮量的增加,水稻有效穗数显著增加,从而显著提高水稻产量,而当施氮量超过150 kg/hm<sup>2</sup>时,增产效果不显著。随着施氮水平的提高,出糙率、精米率、整精米率和蛋白质含量也逐渐增加,而垩白粒率、垩白度、直链淀粉含量和胶稠度则有所降低。其中出糙率、精米率、整精米率在高肥、中肥、低肥3种施肥处理下差异不显著,但均显著高于不施肥处理。中肥、高肥水平下的垩白粒率、垩白度无显著差异,并均显著低于低肥处理。蛋白质含量、直链淀粉含量和胶稠度在不同施氮水平间的变化最大,各肥料处理间的差异均达到显著水平。施氮量的提高对稻米中Hg含量的影响不明显,但可导致As、Cd含量的升高,其中稻米Cd含量在高肥与中肥水平下的差异显著,As含量在各施氮水平处理间均存在显著性差异。在此试验条件下,适量的增施氮肥,有利于优质稻获得高产并将稻米品质提升到较高水平;通过降低施肥量可减少稻米对As、Cd的吸收和积累,提高食用安全性。在优质稻栽培过程中应适量增加氮肥,施氮水平以不超过150 kg/hm<sup>2</sup>为宜。

关键词: 重金属

Effects of Nitrogen Appliation Level on Yield, Quality, and Hg、As、Cd Concentrations in Grains of High Quality Rice

Abstract:

Studies on the effects of four different nitrogen application levels (zero, low, medium, and high) on yield, quality, and edible safety (Hg, As, Cd concentrations in rice grains) were carried out under field conditions with Gui xiaozhan, a high quality rice, as tested material. The results showed that when the nitrogen application was below 150 kg/hm<sup>2</sup>, with the enhancement of nitrogen application, the panicle per unit area significantly increased so as to enhance the rice yield, but the rice yield insignificantly improved when the nitrogen application was over 150 kg/hm<sup>2</sup>. As the increase of nitrogen application, the brown rice rate, milled rice rate, head rice rate, and protein content were improved, although the chalky grains percentage, chalkiness percentage, amylase content, and gel consistency decreased. Among them, the difference of brown rice rate, milled rice rate, and head rice rate between low, medium, and high nitrogen level was not significant, and they were all significantly higher than the treatment of zero nitrogen fertilizer application. There was no significant difference in chalky grains percentage and chalkiness percentage between medium and high nitrogen level, and they were all significantly lower than the treatment of low nitrogen fertilizer application. The protein content, amylase content, and gel consistency differed dramatically between different nitrogen application levels, and the difference reached to the 0.05 significant level. The results indicated that increasing nitrogen amounts had little effect on Hg concentration in rice, but it could result in increasing content of As and Cd. Among them, the difference in Cd concentration between medium and high nitrogen level was significant, and there was significant difference in As concentration between each nitrogen application treatment. Under this experiment condition, a proper amount of N application was beneficial to increase the rice yield, and improve the rice quality to a higher level. By reducing nitrogen fertilizer, As, Cd absorption and concentration in rice could be minimized, and edible safety could also be improved. The nitrogen fertilizer should be applied properly during high quality rice cultivation, but the nitrogen application rate should not be more than 150 kg/hm<sup>2</sup>.

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通讯作者: 滕斌

作者简介:

作者Email: ricebreeder@163.com

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