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氮肥管理对小麦产量和氮肥利用效率的影响

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摘要:

氮肥过量施用造成环境污染和生产成本增加等问题已成为限制我国农业可持续生产的主要因素。为实现氮素化肥的高效利用,连续2年在山东省农业科学院作物研究所试验地同一地块利用氮肥梯度带,进行了基于小麦叶片SPAD值的氮素实时管理。结果表明,在基施区随着施肥量的增加,小麦籽粒产量增加,二者呈线性关系,但施氮量 $207\text{kg}/\text{hm}^2$ (N_{207})和 $276\text{kg}/\text{hm}^2$ (N_{276})处理间差异不显著;追施区小麦的2个生长季籽粒产量均以不施基肥拔节期追氮 $207\text{kg}/\text{hm}^2$ (N_{0+207})处理最高,分别为 $7649\text{kg}/\text{hm}^2$ 和 $7522\text{kg}/\text{hm}^2$,基施氮肥 $207\text{kg}/\text{hm}^2$ 拔节期不追肥 (N_{207+0})处理最低,仅为 $7318\text{kg}/\text{hm}^2$ 和 $7388\text{kg}/\text{hm}^2$,差异达显著水平 ($P<0.05$)。基施区各氮肥处理的氮肥表观利用率(RE)和氮肥偏生产力(PFP)均存在显著性差异,均是随着基施量的增加而显著降低。追施区 N_{0+207} 、 N_{69+138} 、 N_{138+69} 3个处理的PFP、AE和RE均高于或显著高于 N_{207} 和 N_{276} 2个处理。因此在确定总施氮量的条件下实行基、追肥分施能够显著提高小麦的氮肥表观利用率、氮肥农学效率和氮肥偏生产力。

关键词: 小麦 氮肥梯度带 产量 氮肥利用率

EFFECTS OF NITROGEN APPLICATION PATTERNS ON YIELDS OF WINTER WHEAT AND NITROGEN USE EFFICIENCY

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Abstract:

Excessive application of nitrogen caused many problems such as environmental pollution and increased production costs, which became major obstacles in agricultural production. To achieve efficient use of nitrogen fertilizers in agricultural production and ease the pressure on the environment, two consecutive years nitrogen-rich strips test were implemented at the crop research institute, Shandong academy of agricultural sciences to the same plots with nitrogen gradient. Real-time management of nitrogen were based on leaf SPAD values. Results indicated that, in the basal area increased with the amount of fertilizer, grain production increased, with a linear relationship between them. Highest yield was obtained under N_{0+207} treatment at base-additional fertilizer strips of two growing season, while lowest yield was by N_{207+0} treatment. Significant differences were found in base fertilizer strips of recovery efficiency of applied nitrogen (RE) and partial factor productivity from applied nitrogen (PFP), which was significantly lower with increasing of the base nitrogen amount. In base-additional fertilizer strips, PFP, AE and RE of the three treatments, N_{0+207} , N_{69+138} and N_{138+69} were higher or significantly higher than N_{207} and N_{276} treatments. Recovery efficiency of applied nitrogen RE, agronomic efficiency of applied nitrogen (AE) and partial factor productivity from applied nitrogen (PFP) could be improved with implementing topdressing when the total amount of nitrogen was determined.

Keywords: wheat nitrogen-rich strips yield nitrogen use efficiency

收稿日期 2011-06-30 修回日期 2011-10-27 网络版发布日期

DOI:

基金项目:

国家小麦现代农业产业技术体系(CARS-3-1-21),公益性行业(农业)科研专项经费项目(201203079,200903007-03,200903010,201103033),国家科技支撑计划项目(2011BAD16B09,2011BAD16B14)

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