



河南植棉区施氮量对麦棉两熟产量及氮肥利用率的影响

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Effect of Nitrogen Application Rate on Yield and Nitrogen Use Efficiency of Wheat-Cotton Double Cropping in the Henan Cotton Region

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摘要

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摘要 研究了河南植棉区麦棉两熟施氮量对两季产量和氮肥利用率的影响。结果表明, 施氮能显著提高小麦产量、总有效穗数和穗粒数, 籽粒千粒重随施氮量增加而降低; 商丘和内黄试验点小麦最高产量所需的施氮量分别为 $201.4 \text{ kg} \cdot \text{hm}^{-2}$ 和 $187.2 \text{ kg} \cdot \text{hm}^{-2}$, 经济最佳施氮量分别为 $163.0 \text{ kg} \cdot \text{hm}^{-2}$ 和 $134.9 \text{ kg} \cdot \text{hm}^{-2}$ 。施氮也能显著提高棉花产量和单株成铃数; 适量施氮可提高铃重; 商丘和内黄试验点棉花最高产量所需的施氮量分别为 $244.4 \text{ kg} \cdot \text{hm}^{-2}$ 和 $224.2 \text{ kg} \cdot \text{hm}^{-2}$, 经济最佳施氮量分别为 $225.9 \text{ kg} \cdot \text{hm}^{-2}$ 和 $207.0 \text{ kg} \cdot \text{hm}^{-2}$ 。小麦氮肥利用率以施氮量 $180 \text{ kg} \cdot \text{hm}^{-2}$ 最高。麦棉两季氮肥利用率, 商丘试验点随施氮量增加而降低; 内黄试验点以施氮量 $390 \text{ kg} \cdot \text{hm}^{-2}$ 最高。小麦、棉花氮肥偏生产力、农学利用率均随施氮量增加而降低。

关键词: 河南植棉区 麦棉两熟 施氮量 产量 氮肥利用率

Abstract: To study the effects of nitrogen application rate on yield and nitrogen use efficiency (NUE) of the wheat-cotton double cropping system in the Henan cotton region, we conducted two field experiments in Shangqiu city and Neihuang County, Henan Province. The result showed that wheat yield, total effective spike numbers and grains per spike increased significantly with nitrogen application rate. However, the 1000-grain weight decreased. Maximum wheat yield was obtained at nitrogen application rates of $201.4 \text{ kg} \cdot \text{hm}^{-2}$ and $187.2 \text{ kg} \cdot \text{hm}^{-2}$ at the two experimental sites, respectively, whereas optimum yield was at rates of $163.0 \text{ kg} \cdot \text{hm}^{-2}$ and $134.9 \text{ kg} \cdot \text{hm}^{-2}$. With increasing nitrogen application rate, cotton yield and boll numbers per plant also increased significantly. An optimal nitrogen application rate was favorable for improving boll weight. Maximum cotton yield was achieved at nitrogen application rates of $244.4 \text{ kg} \cdot \text{hm}^{-2}$ and $224.2 \text{ kg} \cdot \text{hm}^{-2}$ in the city of Shangqiu and in Neihuang County, respectively, whereas optimum cotton yield was at rates of $225.9 \text{ kg} \cdot \text{hm}^{-2}$ and $207.0 \text{ kg} \cdot \text{hm}^{-2}$. The highest NUE in wheat was attained at the nitrogen application rate of $180 \text{ kg} \cdot \text{hm}^{-2}$. At the Shangqiu experimental site, total NUE in the wheat-cotton double cropping system declined with increasing nitrogen application rate. However, highest total NUEs were obtained at the rate of $390 \text{ kg} \cdot \text{hm}^{-2}$ at the Neihuang County site. With increasing nitrogen application rate, both nitrogen partial factor productivity and agronomic efficiency in wheat and cotton decreased.

Keywords: Henan cotton region wheat-cotton double cropping nitrogen application rate yield nitrogen fertilization use efficiency

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