



灌溉方式和施氮量对棉花生长及氮素利用效率的影响

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Effects of Irrigation Methods and N Application Level on Cotton Growth and Nitrogen Use Efficiency

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摘要

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摘要 设置2年田间小区试验,探讨了不同灌溉方式及施氮量对棉花生物量、氮素吸收量、皮棉产量及氮素效率的影响。结果表明,与漫灌相比滴灌显著增加了棉花生物量、氮素吸收量、皮棉产量以及氮肥利用率;滴灌棉花地上部各器官干物质积累量和氮素吸收量显著大于漫灌,而地下部干物质积累量和氮素吸收量显著低于漫灌,滴灌条件下较好的水分条件抑制了棉花根系生长而促进地上部生长。施用氮肥显著提高了棉花生物量、氮素吸收量。皮棉产量在施氮量为360 kg·hm⁻²时最大,过高氮肥投入无助于棉花产量提高。随着施氮量的增加,氮肥利用率、农学利用率、偏生产力均显著降低。灌溉方式与施氮量互作效应对棉花单株铃数及皮棉产量产生显著影响。

关键词: 灌溉方式 施氮量 产量 氮素利用效率 棉花

Abstract: We investigated the effects of different irrigation methods(drip and flood) and N application dose on cotton plant biomass, fertilizer N accumulation, lint yield of cotton, and nitrogen use efficiency, in a two-year field experiment. We found that drip irrigation significantly increased cotton plant biomass, N uptake, lint yield of cotton, and N use efficiency (NUE) in comparison with flood irrigation. Biomass and N accumulation in all plant parts under drip irrigation were significantly greater than under flood irrigation, except for the roots. This suggested that the improved water regime of drip irrigation reduced cotton root growth while it improved shoot growth. N fertilizer application significantly increased cotton plant biomass and nitrogen absorption. Multiple comparisons between different N dosages showed that the highest lint yield was at 360 kg·hm⁻², followed by 480, 240 and 0 kg·hm⁻², showing that excess N input did not contribute to higher lint production. Increased N fertilizer application resulted in lower N use efficiency, N agronomic efficiency, and N partial factor productivity. Significant interaction was observed between irrigation methods and nitrogen on boll number per plant and lint yield of cotton.

Keywords: irrigation methods N application rate yield nitrogen use efficiency cotton

Received 2012-03-25;

Fund:

农业部行业公益性专项“农作物最佳养分管理技术研究与应用”(201103003)

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