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研究与进展

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水肥调控策略对膜下滴灌棉花冠层结构和产量的影响

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Effects of Water and Fertilizer Regulation Strategies on Cotton Canopy Structure and Yield under Mulch Drip Irrigation

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摘要

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摘要 测定了膜下滴灌棉花常规灌溉施肥、优化灌溉、优化施肥等不同水肥调控处理下棉花生育期叶面积指数等冠层特征, 分析了棉花冠层结构的动态变化及其与产量的关系。结果表明: 常规灌溉下氮磷配合的常规施肥可显著增加棉花叶面积指数、平均叶倾角, 极显著降低散射和直射辐射透过系数, 极显著提高单位面积结铃数和铃重, 从而极显著提高子棉产量; 只使用氮磷肥、不使用钾肥改为氮磷钾肥平衡施用, 棉花叶面积指数和平均叶倾角略减, 散射和直射辐射透过系数降低, 单株结铃数增加, 从而进一步提高子棉产量。在常规施肥下减少灌溉量、优化生育期灌水次数和灌水量, 可增大棉花叶面积指数和平均叶倾角、降低散射和直射辐射透过系数, 提高铃重, 从而显著提高子棉产量。

关键词: 棉花 水肥耦合 调控策略 冠层 产量

Abstract: Determined cotton leaf area index and other canopy characteristics in full growing period under mulch drip irrigation of the conventional irrigation fertilization, optimized cotton irrigation, optimized fertilization, and analyzed the dynamics of cotton canopy structure and its relationship with yield. The results showed that: conventional fertilization with N and P in the conventional irrigation could make the cotton LAI (Leaf area index) value and MFIA (Mean foliage inclination angle) value significantly increase, TC (Transmission coefficient for diffuse penetration) value and T (Transmission coefficient for radiation penetration) value significantly reduced, which can make the number of bolls per unit area and boll weight significantly increase, and then led to the seed cotton yield significantly increased; N, P, K balanced fertilizer can make the cotton LAI value and MFIA value slightly decreased, reduce TC value and T value, which can increase boll number and then improve seed cotton yield. In conventional fertilization, reducing water amount, optimizing irrigation frequency and irrigation water of the growth period can increase the cotton LAI value and MFIA value, reduce TC value and T value, which can increase boll weight and then make seed cotton yield significantly increased.

Keywords: cotton fertilization coupling with irrigation regulation strategy canopy yield

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