

施氮量对杂交棉光合生理特性及产量、品质的影响

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Effects of nitrogen application rates on photosynthetic and physiological characteristics and yield and quality of hybrid cotton

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摘要 在高产条件下, 研究了施N 0、75、150、225、300和375 kg/hm²对杂交棉主茎叶的叶绿素含量、净光合速率、硝酸还原酶活性、可溶性糖和可溶性蛋白质含量及产量、品质的影响。结果表明, 施N 0300 kg/hm²条件下, 随叶龄增长, 施氮量增加光合生理活性指标增长快, 衰减慢; 而施N 375 kg/hm²时衰减快, 呈现出先增后减趋势。在棉花生长期前期(7月5日)各处理间光合生理活性指标差异不显著。到中后期, 施氮量则对这些指标有明显影响, 表现出施N 0225 kg/hm², 随施氮量增加而显著增高; 但施N 300、375 kg/hm², 与施N 225 kg/hm²相比, 并没有显著提高, 而且施N 375 kg/hm², 在植株生长后期这些指标反而比施N 300 kg/hm²处理降低。随施氮量增加, 棉花总铃数、烂铃率和生物产量随之增加, 收获系数下降。施N 0300 kg/hm², 铃重随施氮量增加而提高, 施N 375 kg/hm²则下降。衣分受施氮量影响较小, 施N 0225 kg/hm², 子棉产量随施氮量增加而显著增产; 而施N 300 kg/hm²时, 子棉产量比施N 225 kg/hm²的仅增产1.66%, 施N 375 kg/hm²水平, 其子棉产量比施N 225和 300 kg/hm²处理减产2.23%和3.92%。此外, 施氮比对照显著提高了纤维长度和纤维比强度, 而施氮处理间差异不显著。说明在本试验条件下, 施 N 225~300 kg/hm²范围内, 有利于显著提高杂交棉主茎叶光合生理活性, 延长叶片高光合持续期, 显著提高杂交棉产量。

关键词: 杂交棉 施氮量 光合生理特性 产量 品质

Abstract: Effects of nitrogen application rates(N 0, 75, 150, 225, 300 and 375 kg/ha)on chlorophyll content, net photosynthetic rate, nitrate reductase activity, contents of soluble sugar and soluble protein in main stem leaves, yield, fiber quality of hybrid cotton were studied under high yield conditions. The results show that above photosynthetic and physiological indices are increased at the earlier stages of cotton and decreased at the later stages. The increasing trends of these indices are under the N rates in range of 0-300 kg/ha, while compared with N 300 kg/ha application these indices are decreased obviously at the later stages under N 375 kg/ha application. The results of the comparisons among different N rates indicate that photosynthetic and physiological characteristics have no significant differences on July 5, but at the middle and late growth stages, the N rates have strong effects on them. The photosynthetic and physiological characteristics are increased with the increase of N rates in the range of 0-225 kg/ha, but when N 300 or 375 kg/ha is applied, the photosynthetic and physiological indices are no longer increased significantly. On the contrary, the photosynthetic and physiological indices are decreased when N 375 kg/ha is applied. The total boll number, rotten boll rate and biomass are increased when more N is applied, while the harvest index is decreased. The boll weight is increased with the increase of N rates in the range of 0-300 kg/ha, while it is decreased when the N rate is up to 375 kg/ha. The N rates have little effects on the cotton lint percentage. Seed cotton yield is increased with the increase of N rates in the range of 0-300 kg/ha, but it is decreased by 3.92% when N rate is 375 kg/ha. As to the fiber quality, applying nitrogen could improve the fiber length and fiber strength significantly; however there are no significant differences among different N rates. It is concluded that the leaves of hybrid cotton have higher photosynthetic capability and longer photosynthetic duration when N 225-300 kg/ha are applied which is benefit to increase yield under this experiment conditions.

Keywords: hybrid cotton nitrogen application rate photosynthetic physiological characteristic yield; fiber quality

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