PHYSIOLOGICAL CONTRIBUTORS TO COTTON YIELD LOSS UNDER NITROGEN STRESS

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Abstract

The effects of nitrogen fertilization on lint yield have been studied extensively in cotton. However, reports addressing the underlying physiological limitations to lint yield are far less common. Because light interception by the canopy (IPAR), radiation use efficiency (RUE), and harvest index (HI) govern yield in all crops, an experiment was conducted at a field site near Tifton, GA during the 2021 growing season to assess the relative contribution of each parameter to nitrogen-induced yield loss. The experiment was arranged as an RCBD design with 5 replications and 5 nitrogen application rates- 0, 44, 89, 134, and 179 $kgNha^{-1}$. The studied parameters were lint yield, IPAR, RUE, HI, and yield loss contributions for physiological parameters. Lint yield was significantly different among the five treatments with the highest yield seen for 179 $kgNha^{-1}$ and the lowest for 0 $kgNha^{-1}$, with values ranging from 1549 to 1008 $kgha^{-1}$. Similarly, total light interception was found to be significantly different among the nitrogen treatments, with the highest interception of 570 MJm^{-2} for the 179 $kgNha^{-1}$ treatment. IPAR was the only factor which contributed significantly to yield loss and 74% of total yield loss for 0 $kgNha^{-1}$ was explained by IPAR. Therefore, among the three physiological yield-driving parameters, light interception by the canopy was the primary contributor to nitrogen-induced yield variation, and RUE and HI were not significantly affected by the treatments.