

**POTASSIUM EFFECTS ON CANOPY LIGHT
INTERCEPTION AND EARLINESS
OF 'DELTAPINE 50' COTTON**

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Abstract

Potassium (K) deficiency may reduce upper-canopy light interception and reduce yield from late-set bolls, thus inducing earliness of maturity. Objectives of this research were to determine the influence of soil-applied and foliar K fertilization on interception of photosynthetically active radiation (PAR) and earliness, and to describe the relationship between light interception at different in-canopy heights and earliness of maturity, as influenced by K. Research was conducted on a Memphis silt loam with low extractable K at Ames Plantation TN. Cotton 'DPL50' was planted on 29 Apr 1993 and 6 May 1994 in 40" rows, using no tillage. A split-plot RCB design was used, with 0 and 120 lb K₂O/acre soil-applied as main-plot treatments, and 0 and 4.4 lb K₂O/acre foliar applied four times per season as sub-plot treatments. All plots received broadcast applications of 80 lb N and 60 lb P₂O₅/acre each year before planting. Interception of PAR was measured on 7 Aug 1993 and 25 Aug 1994 at 9" vertical increments through the canopy. In 1993, a LI-COR LI-191 line quantum sensor was used above and within the canopy. In 1994, the line sensor was used in-canopy while a LI-COR LI-190 point quantum sensor was used above the canopy. Plots were spindle-picked on 12 Oct and 2 Nov 1993, and on 4 Oct and 31 Oct 1994. Samples were ginned to determine lint yields, and earliness was measured as the percent of total yield picked at first harvest.

Soil-applied K increased canopy PAR interception at all heights measured in both years. The greatest relative increase was measured near the top of the canopy. At 27" height, 120 lb K₂O/acre increased PAR interception from 12 to 35% in 1993, and from 45 to 66% in 1994. Soil-applied K also increased lint yields in both years, but affected earliness only in 1994, a year of adequate rainfall. In that year, soil-applied K decreased percent first harvest from 78 to 65%. Neither soil-applied nor foliar K affected earliness in 1993, a drought year. Foliar K did not affect canopy light interception in 1993. It increased PAR interception in 1994 only with no soil-applied K. The greatest relative response was measured at 27" height, where 17.6 lb K₂O/acre increased late-season PAR interception from 38 to 52%. Foliar K increased yields only in absence of soil-applied K, from 341 to 485 lb lint/acre in 1993, and from 460 to 728 lb lint/acre in 1994. Foliar K did not affect earliness in either

year. In 1994, variation in percent first harvest due to K was negatively correlated with late-season PAR interception at all measured heights in the canopy. Linear correlation coefficients ranged from -0.72 at 9" to -0.65 at 36" height in canopy. Increases in mid- and upper-canopy PAR interception due to K were associated with relative lateness of maturity, suggesting the importance of these leaf layers and corresponding fruiting sites to the later-harvested crop.

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