

DETERMINATION OF COTTON LEAFROLL DWARF VIRUS INDUCED LIMITATIONS TO PHOTOSYNTHESIS AND YIELD OF COTTON**Ved Parkash****Divya Bhanu Sharma****John L. Snider****Sudeep Bag****Phillip Roberts****Afsha Tabassum****Dalton West****Sameer Khanal****University of Georgia****Tifton, GA****Nelson Dias Suassuna****Brazilian Agricultural Research Corporation – EMBRAPA****Santo Antonio de Goias - GO, Brazil****Peng Chee****University of Georgia****Tifton, GA**

Cotton leafroll dwarf disease (CLRDD) caused by cotton leafroll dwarf virus (CLRDV) is an emerging threat to cotton production in the United States. The disease was first reported in Alabama in 2017 and subsequently has been reported in ten other cotton producing states in the US, including Georgia. A field study was conducted at field sites near Tifton, Georgia in 2019 and 2020 to evaluate leaf gas exchange, chlorophyll fluorescence, and yield responses for a symptomatic cultivar at multiple stages of disease progression. Disease-induced reductions in net photosynthetic rate (A_n , decreased by 63-101%), stomatal conductance (g_s , decreased by 65-99%), and electron transport rate (ETR, decreased by 32-92%) were observed at advanced stages of the disease. Net photosynthesis was substantially more sensitive to disease-induced declines in g_s than the thylakoid reactions. Symptomatic plants with more advanced disease stages remained stunted throughout the growing season, and yield was reduced by 99% by CLRDD due to reductions in boll number per plant and declines in boll mass resulting from fewer seeds per boll. Overall, it is concluded that CLRDV limits stomatal conductance and photosynthetic activity of individual leaves, causing substantial declines in productivity for individual plants. Future research should evaluate the possibility that an imbalance between the thylakoid reactions and carbon assimilation leads to oxidative stress in diseased tissues.