Effects of Elevated CO2 Concentration and Water Stress on Leaf Water Potential, Water Use and Root Growth of Cotton. (A03-timlin083115-Poster)

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Abstract:

There is limited quantitative data to evaluate the effects of water stress on root growth for modeling purposes. The objective of this study was to investigate the effects of two water stress levels under ambient (350 ppm) and elevated (700 ppm) CO2 concentrations on root growth and water use of cotton plants. This research was carried out in six sun-lit SPAR (Soil Plant Atmosphere Research) units with soil bins located in Beltsville, Md. Whole canopy photosynthetic and transpiration rates, and soil water content were measured continuously. Pre-dawn and midday leaf water potentials were measured during the water-stress and the recovery periods. Root growth was monitored using a minirhizotron system and final root mass calculated from soil cores taken at the end of the growing season. The water uptake rates for the cotton plants grown under elevated CO2 were significantly lower than those grown under ambient for both the water stressed and well watered plants. The total root growth at the end of the season was higher for the water stressed elevated CO2 plants than for the water stressed ambient. The lowest leaf water potentials and smallest soil water contents were associated with the water stressed ambient CO2 plants.

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Presentation Information:

Presentation Date: Monday, November 11, 2002

Presentation Time: 2:00-4:00 pm
Poster Board Number: 531

Keywords:
SPAR, root to shoot ratio, root growth, climate change