

# **DEVELOPMENT OF AN AVAILABLE SOIL WATER INDEX TO CHARACTERIZE SITE WATER-DEFICIT STRESS EXPERIENCED IN COTTON VARIETY TRIALS**

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## **Abstract**

Although a large number of dryland variety trials are conducted throughout the Cotton Belt, drought in these trials is most often characterized by rainfall quantities alone. If experienced drought could be more accurately characterized, varietal yield response from multiple trials could be combined to create robust, reliable yield by drought-stress response curves independent of location. The objectives of this initiative were to (1) develop a soil moisture-based index to quantify locational drought stress and to (2) determine the plausibility of extrapolating readings to the field scale from a limited number of point measurements. During the 2012 and 2013 growing seasons, seven developmental trials and eight testing trails were conducted from AZ to SC. The number of sensors deployed varied with trial type, but each profile soil moisture measurement consisted of four volumetric,

capacitance-based soil moisture sensors at four depths, varying from 3-30 inches. The developed soil moisture stress index (SMSI) is calculated on a 15 minute time interval as a function of experienced drought stress derived from depletion of plant available water (PAW) and crop susceptibility to drought. Stress unit weights increase exponentially as water content decreases from 50% to 0% PAW. Values are accumulated through the growing season. Correlations between accumulated SMSI values and seedcotton yields varied by location, but were generally moderate to strong. Preliminary spatial analysis suggests a limited number of sensors under a standard variety could be used to characterize location drought stress, therefore increasing the utility of dryland variety trials.