Crop Stress Physiology Studies

Description
Breeding plant cultivars and identifying crops that tolerate physiological stress are critical for long-term agricultural production in high-stress environments. In pursuit of this goal, researchers in the Texas AgriLife Research Center at Vernon developed and installed a subsurface drip irrigation (SDI) system in 2006 at the Chillicothe Station. This system is capable of evaluating the effects of drought stress on crops and crop production systems in a semiarid environment. This SDI system offers challenges and rewards for cotton producers who plant cotton continuously on the same land or in crop rotation systems.

Research and Results
- The SDI system at Chillicothe includes 72 individually-controlled 0.18-acre plots. Wireless flow meters in each plot allow precise monitoring of water input and subsequently more precise irrigation programming. There are 24 stations at which crops can be irrigated on either on 40- or 80-inch drip line centers. For seed increases and other larger scale production research, there are seven 2.5-acre fields that are individually controlled for water and fertilizer application. For specialty crops and forages, small seed increases, and environmental studies limited by seed availability, there are eight plots with 20-inch drip line centers.

- All drip lines were placed 12 to 14 inches deep utilizing GPS/autosteer technology that provides sub-inch accuracy necessary for accurate field research. Because water management can be highly controlled in a hot, semiarid environment, the SDI system at Chillicothe is an ideal location to conduct stress physiology research on cotton, corn, sorghum, sesame, small grains, forages, etc. The farm is being fenced to provide increased security and eliminate access for certain types of wildlife (particularly feral hogs) that can impact research results. An experienced farm crew, technical help, and all essential equipment are available to conduct sponsored research and seed increases under SDI, furrow, or dryland conditions. Irrigation from shallow wells is adequate, and cotton root rot has not been observed at the Chillicothe location.

- The AgriLife Research station at Chillicothe is unique and offers an outstanding location for both public and private agricultural sectors to conduct traditional as well as heat and drought stress physiology research for a variety of field and specialty crops.

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