COTTON LINT YIELD, FIBER QUALITY, AND WATER-USE EFFICIENCY AS INFLUENCED BY CULTIVAR AND IRRIGATION LEVEL

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Abstract

Cotton is produced in the Texas High Plains under a wide range of water levels, ranging from dryland to full irrigation. Irrigated cotton is grown under varying levels of deficit irrigation, depending on well capacities. With declining well capacities, it is important to maximize water-use efficiency by crop management and cultivar selection. Field studies were conducted in 2011 to evaluate new cultivars under varying irrigation inputs at the AG-CARES research farm near Lamesa, TX and Texas Agrilife Research and Extension Center at Lubbock. The objective of this study was to determine lint yield, fiber quality, and water-use efficiency (WUE) as influenced by cultivar and irrigation level. Trials were set up using a randomized complete block design with three replications. At the Lamesa location, the trial was conducted using an overhead sprinkler irrigation system equipped with a low energy precision application (LEPA) nozzling package. The Lamesa test was planted on May 27 in plots 4 rows wide by 95 feet in length, and harvested on November 10. The Lubbock location was in a field with a sub-surface drip irrigation system with drip tape spaced every 80 inches. The Lubbock test was planted on May 9 in 4 row plots that were 70 feet in length, and harvested on September 30. Target in-season irrigation levels were limited by the well capacity at each location. The Lubbock trial had a target of 30%, 60%, and 90% in-season evapotranspiration (ET) replacement, while Lamesa was 40%, 60%, and 80% in-season ET replacement. Eight varieties were tested, including five experimental cultivars and three current commercially available varieties. Due to almost no rainfall and record high temperatures, irrigation requirements were well-above average for both locations. Yields and fiber quality, namely fiber length, were reduced due to the drought. At Lubbock, lint yields increased as irrigation level increased, but in-season WUE was similar across irrigation levels. Yield differences between cultivars were observed only at the low and high irrigation levels. Differences in loan value between cultivars were observed only at the high irrigation level, and no difference in loan values between irrigation levels was found. At Lamesa, lint yields and in-season WUE increased as irrigation level increased. Yield differences between cultivars were observed at low and medium irrigation levels. Loan values increased as irrigation level increased. Differences in loan values between varieties were observed within each irrigation level. Trials will be repeated at the same locations in 2012.