

**RELATING EL NIÑO–SOUTHERN OSCILLATION CLIMATE CONDITIONS TO IRRIGATION
STRATEGIES FOR INCREASED COTTON YIELD****R. Louis Baumhardt****USDA-ARS Conservation & Production Res. Lab.****Bushland, TX****Steve A. Mauget****USDA- ARS Cropping Systems Res. Lab.****Lubbock, TX****Abstract**

The global-scale El Niño–Southern Oscillation (ENSO) of sea surface temperature that causes monsoonal rain in India also affects precipitation in North America. The ENSO phases and related rain expectations have been used to limit climate uncertainties when producing wheat for grazing and grain. Insight into fall climate conditions may refine irrigation management options that limit production risk for predictable growing season duration. Our objective was to quantify the periodic ENSO climate effects on simulated cotton lint yield in response to planting date and irrigation capacity and duration for the Texas High Plains. We used the cotton simulation model, GOSSYM, to calculate growth and yield of cotton emerging on day of year 145, 152 and 159 at Bushland for 4, 6, 8, and 10 weeks of irrigation at rates of 2.5, 3.75 and 5.0 mm/d considering actual weather data from El Niño, La Niña, and normal years between 1958 and 2000. Using simple ANOVA methods where years were random effects, delayed emergence consistently decreased yield 15-20% per week for all ENSO conditions. The drier and warmer La Niña fall periods extended the growing season for maturing late bolls and using longer seasonal irrigation, but favorable rain during both El Niño and normal years increased lint yield despite any potential growing season truncation. Although irrigation at rates greater than 2.5 mm/d increased yield for all ENSO conditions, irrigation duration exceeding 6-weeks similarly maintained yields during El Niño and normal years.