

REGULATED DEFICIT IRRIGATION AND THE PHYSIOLOGICAL RESPONSES OF COTTON IN SW TEXAS**Y. Wen****J. T. Cothren****Texas A&M University, Texas Agrilife Research****College Station, TX****G. Piccinni****Texas AgriLife Research and Extension Center at Uvalde****Uvalde, TX****Abstract**

The urban water demand in Southwest Texas is increasing rapidly in recent years due to the population increase in this area. One possible way to assist in solving this problem is to reduce the agricultural water use; however, the crop yield should not be affected. Regulated deficit irrigation (RDI) is a widely used measure for saving water and maintaining crop yield. In the past few years, three irrigation treatments (100%, 75%, and 50%) were tested on cotton and sorghum, and the experimental results showed that 75% and 100% treatments have no significant difference on crop yield, which means 25% of the irrigation water can be saved. In 2008, an experiment with seven treatments (100%, 80%, 70%, 60%, 50%, and two dynamic: 70%D and 50%D) were developed to test whether more water can be saved on irrigation, and how the four different cotton cultivars responded to the different RDI schemes. The data analysis showed that 1) the cultivar effects are minor. DP555 had higher lint yield and plant height than the other three cultivars, which had no significant differences. The other measurements illustrate some variations with significance; however, the values are numerically not obvious. 2) The fixed RDI threshold (the maximum water saving point) should remain between 70% and 80%. With reference to the dynamic RDI, possibly 50% of the irrigation water can be saved without affecting the lint yield. The plant height can be reduced if only 50% irrigation is applied, regardless of a fixed or dynamic scheme. With decreasing irrigation rate, photosynthetic rate and leaf stomatal conductance decreased, while water use efficiency increased. Dynamic RDI can improve photosynthetic rate and stomatal conductance, but may decrease WUE.