

**COTTON WATER USE AND YIELD RESPONSE TO DEFICIT IRRIGATION STRATEGIES, TILLAGE,
AND APPLICATION METHOD****R. Louis Baumhardt****Paul D. Colaizzi****USDA-Agricultural Research Service****Bushland, Texas****Abstract**

Producers are motivated to limit irrigation applications or improve irrigation water use efficiency because of (i) volatile fuel prices that increase pumping costs and (ii) declining water resources that frequently limit application capacity. Reducing evaporation of rain, soil water, and irrigation is a common solution to maintain yield while pumping less water. Conservation tillage practices like no-tillage retain crop residues on the soil surface. This increases rain infiltration and reduces evaporation of soil water and any irrigation applied during the growing season. As a result, water use efficiency (WUE) and yield of irrigated crops increase. Likewise, both subsurface drip irrigation (SDI) and low energy precision application (LEPA) reduce evaporation and increase the water available to the crop compared with irrigation by mid or low level spray application (MESA or LESA). Although total water use is often unaffected by application method, limiting evaporation from the soil with SDI or LEPA increased cotton yield resulting in higher WUE. Where irrigation water resources are insufficient to meet crop demand (deficit irrigation), two very different irrigation strategies have been proposed to optimize net crop yield. They are either to spread water over more land or to concentrate that same water on a smaller area. When irrigating for 8-weeks, our results show that concentrating water on less land (higher irrigation capacity) improved crop WUE and increased yield approximately 5% compared with uniform deficit irrigation. During a 4-week irrigation period, concentrating irrigation water maintained lint yield within 5% of the 8-week uniform deficit irrigation.