

TR-107

Automation of Pivot Sprinkler Irrigation Systems to More Efficiently Utilize Rainfall and Irrigation Water

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A study was conducted to develop automated pivot sprinkler irrigation systems and determine if such systems use less water and energy than manually operated systems. The study was conducted near Earth, Texas, using irrigation systems located on producers farms.

Sensors with transmitters and receivers were constructed and tested so that the irrigation systems can be controlled by wind, soil water tension, and rainfall. The sensors can be used separately or in combination to control the irrigation systems.

For several reasons it was not possible to determine if automated systems use less water and energy than manually operated systems. The major reason was the low capacity of the wells (114 to 204 m³/hr) supplying the irrigation systems.

To meet crop water requirements and losses due to evaporation and runoff, the well capacity should be at least 284 m³/hr. Since the wells could not supply adequate water, soil water tension was out of the tensiometer range for the last 60 days of the growing season. Considerable variation in soil water tension and content was noted between irrigation systems and within quadrants of each irrigation system. Systems planted to cotton would probably be easier to automate than those planted in corn because of the lower water requirements of cotton.

The wind and rainfall controls have more promise to aid in increasing water use efficiency than controls activated by soil water sensors. Wind controls could be used during preirrigation when more time is available to apply water and rainfall controls could be an aid to producers with remotely located irrigation systems.

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