Long-term Water Optimization Trials: Stacking Conservation Practices

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Focus Question: What irrigation and agricultural management practices can increase water productivity (that is, increase the beneficial output or yield per volume of water consumed) in Utah?

Key Finding: Field testing of LEPA/LESA sprinkler system combinations, tillage, crops, cover crops, and deficit irrigation have proven the feasibility of reducing water consumption and maintaining agricultural production in Utah.

This project seeks to provide agricultural producers and water managers with tools for agriculture water-use optimization. Can water optimization practices reduce water use and maintain or increase yields?

Figure 1. Water optimization trial (20 acres) at the Utah State University Wellsville Farm

Utah State University (USU) is partnering with Southern Utah University, the irrigation industry, water conservancy districts, soil and water conservation districts, Utah water agencies, and several other federal and state organizations to evaluate and demonstrate more than 25 water optimization practices (Figure 1). The major objective is to "*identify which combinations of pivot irrigation and crop management practices result in optimized use of limited water supplies, reduced consumptive use, and the best yield and profit outcomes for producers.*" The trials include evaluations of pivot irrigation technologies (such as MDI, LEPA, and LESA) and how the best available drought-tolerant crop genetics, cover crops, tillage practices, and alternative crops influence water optimization. These side-by-side evaluations are the first of their kind and were established in Logan in 2019, Vernal in 2020, and Cedar City in 2021 (Figure 2). This information should be especially useful in guiding water conservation planning at the farm level, which would in turn have large impacts on planning efforts at watershed and basin levels. It will also help irrigators prepare to effectively participate in water demand and banking programs, should they be developed and necessary.

See https://extension.usu.edu/crops/irrigation-pivots-laterals for additional information.

Results

- LEPA/LESA systems have shown that they can maintain production using 25% less water. Although water users are already installing these systems, they are typically not reducing application rates as the improved efficiency can improve their yields.
- Mobile drip systems have been a challenge due to the quality of water, among other things.
- USU has not observed any remarkable benefit from different plant genetics; it is likely not worth the investment.
- Not enough time has transpired at this point to observe the effects of no-till and cover crops.
- Deficit irrigation strategies during key growth periods have not shown much of an impact; it is probably the same for a producer to apply half the water throughout the year than during key periods.
- USU has been tracking actual depletion via soil moisture sensors. There were some initial challenges but systems are operating well now. These datasets have not been analyzed at this stage.

Figure 2. Comparing low elevation sprinklers with a mobile drip system