

Management Practices for Drip Irrigation in Baca County, Colorado

James Valliant (Colorado: Professional + Producer Grant Program)

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Title: Management Practices for Drip Irrigation in Baca County, Colorado

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Computer controls and filters for the drip system.

Cooperator: Brent Morris
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SARE Grant: \$9,353



Arizona Drip Wide Bed Disk.

Gandy box feeding AgriBlend above drip lines.

Situation:

Concern over aquifer dewatering in southeastern Colorado prompted the Baca Conservation District to join the Natural Resource Conservation Service in 2003 to offer irrigators 75% cost-share incentive of \$900 an acre to install subsurface drip irrigation.

The idea was that drip irrigation, with efficiencies ranging as high as 98%, could more efficiently deliver increasingly scarce water than either commonly used furrow irrigation or recently introduced center pivot systems. Frequent high winds reduce the efficiencies of both systems, furrow through evaporation and center pivot from interrupted spray patterns.

Driven by the need to use remaining groundwater more efficiently and by the high cost of pumping, growers are looking for more efficient, profitable systems to produce current crops that include corn, grain sorghum, sunflowers and wheat as well as high-value crops like cantaloupe, onions, squash and other vegetables.

Early experience with drip showed the need to develop better management practices suited to local conditions.



Six rows of onions being planted on the bed.



Roughing furrows to reduce damage from windblown sand.

Objectives:

- Test the performance of subsurface drip irrigation on high-value crops
- Assess tillage methods for maintaining beds over subsurface drip lines in the same location
- Test plants for their ability to protect emerging high-value crops from blowing sand
- Find ways to improve the movement of water from subsurface drip lines to shallow-planted seed for adequate germination and emergence
- Disseminate information to growers on the findings through field days and publications

Oats, triticale and wheat in the middle of an 80-inch bed to reduce wind damage.



Excellent stand of seeded onions with little wind damage.

Actions:

The cooperators are Brent and Penni Morris, Baca County producers who own or rent 1,600 acres of dryland ground, growing wheat, grain sorghum and sunflowers, and 1,780 acres of irrigated ground, growing corn, grain sorghum, onions, sunflowers and wheat. Test plots were conducted on two zones (6.3 acres each) of a 170-acre drip irrigation system, installed in 2003. Also involved was Mary Kay Higgins, a landowner and partner in the drip operation, who is considered locally as an agricultural innovator.

A specially designed disk (Arizona Drip Wide Bed Disk) was purchased and used to maintain beds as close as possible to the same location each year over the subsurface drip lines.

In spring 2005, oats were planted on the middle of the bed and in the furrow. In spring 2006, a mix of oats, triticale and wheat were planted on the middle of the bed, and the furrows were roughed.

AgriBlend (a combination of Hydrogel, a water-absorbing polyacrylamide, and Zeolite, a water-transporting volcanic material) were incorporated into beds in an attempt to improve germination of small, shallow-planted onion seed.

Results:

- Tilling the beds with the specially designed wide-bed disk maintained the beds in the same location above the drip lines and to prevent their damage.
- The shield crops (oats and a mix of oats, triticale and wheat) and roughing of furrows substantially reduced damage from blowing sand and resulted in excellent stands of onions from seed.
- With well-timed rains in 2005 and 2006, germination in areas treated with AgriBlend and Zeolite and untreated areas produced similar stands.
- In 2005, onion yields in treated and untreated areas were similar: 986 50-pound bags per acre under AgriBlend and 944 bags untreated.
- In 2006, yields varied widely by treatment: 955 bags under AgriBlend; 843 bags untreated. The area treated with AgriBlend also produced a higher number of jumbo-size onions, 628 bags per acre, compared with 510 bag untreated. (A bacterial soft rot infected onions in 2006, preventing commercial harvest.)
- A subsurface drip irrigation workshop was held Jan. 8, 2007, in Springfield, the seat of Baca County, attended by 20 people despite a 3-foot snowstorm the week before. A poster was presented and discussed at the 2006 Bi-annual Field Day at the Colorado State University Arkansas Valley Research Station in Rocky Ford attended by more than 120 people. The final report was also delivered to all area Natural Resource Conservation Service offices. The final report, with photos, is on the CSU webpage, www.colostate.edu/depts/prc/pubs/tr07-13.pdf. The report is also available at: www.colostate.edu/~cwis303.
- The printed Technical Report TR07-13, June 2007, is available from the Colorado State University Agricultural Experiment Station, 121 Shepardson Building, Colorado State University, 3001 Campus Delivery, Fort Collins, CO 80523-3001.



Onions after cold, damp weather in early September.

Potential Benefits:

Many of the groundwater aquifers in Colorado, Kansas and Texas and throughout the Southwest are being rapidly dewatered. With fuel costs rising, water tables dropping and pumping rates diminishing, subsurface drip irrigation offers a way to use less water and still produce a comparable or better crop, making it an economically sound method of irrigation, especially in windy, arid regions.

Many areas of the Southwest are faced with circumstances similar to those in Baca County, making information from this project useful in prolonging groundwater supplies and sustaining local economies.