More Cotton on Half the Water

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Drip irrigation, like the module builder did about 10 years ago, has caused a stir among Arizona cottonmen.

Take it from Howard Wuertz, a UA graduate in agricultural engineering: drip lines under cotton rows save both water and nitrogen fertilizer. With the 1981 harvest, the Pinal County grower completed his second year of experience with drip irrigation. In 1982, based on past successes, he expects to use drip lines under many more acres to replace conventional open furrows as the water-delivery system for thirsty cotton plants.

Why? The answer is easy. For example: On land where his past cotton yields have averaged two-and-a-quarter to two-and-a-half bales per acre, 1981 yields with drip irrigation ran 4.6, 4.71 and 4.41 bales.

"On half the water, half the fertilizer," exclaims Charlie Schultz, farm manager at M and W Farms, the name for Wuertz's operation. Assistant farm manager Scott Tollefson, a UA graduate in entomology, handles the day-to-day drip irrigation management.

Sam Stedman, Pinal County agricultural extension agent, volunteered the estimate recently that "we'll see at least 200 acres of drip irrigation for cotton in Pinal County during 1982." Tollefson predicts more than 500 acres when you add Maricopa and Yuma counties.

Photograph: A crew lays drip irrigation tape at Fred Enke's Pinal County cotton farm. The perforated strip reels off of a spool into a furrow cut by the machine. Then the furrow is covered. (Photos by R.G. Fowler.)

Where furrow irrigation every seven to 10 days allows alternate wetting and drying, a drip system that provides water daily more nearly keeps the cotton plant in a perfect growing environment. In the Wuertz operation, the system is also used to nurse cotton plants along with drip-run nitrogen.

His drip-fed cotton took 80 to 92 units of nitrogen per acre. Meanwhile, his average on conventionally watered cotton was 159 units. That difference translates into a dollar saving of more than $20 per acre.

On the water side of the well-known "bottom line," Wuertz produced his yield bulge on just 31 acre-inches of drip-applied water. Compare that with an average 69 acre-inches for his furrow system. Again, you find a savings. M and W Farms values irrigation water at $2.50 per acre-inch, so with a 38-acre-inch difference in water needs, you're looking at an important $95 an acre.

Atop the two savings, the extra yield per acre adds up to a higher gross, although with current low prices the 1981 cotton crop is hardly a bellringer in terms of dollar return.

No, a drip system doesn't come cheap. At M and W Farms, Wuertz figures that installation for a computer-based system with pumps, filters and associated hardware along the drip lines has cost about $800 an acre. After his 1980 experience with lighter-weight plastic, he put down drip lines last year that are heavier—a 15 mil, double walled tape—and expects to use them again in 1982, and possibly in 1983. At this point, no one really knows how long they will last.

Howard Wuertz, right, answers questions from Phoenix television reporter Kathy Mann about high yields from the cotton he grew with drip irrigation.

Wuertz experimented with three tape depths during 1980, but settled on six inches for 1981. The tape, which costs about two-and-a-half cents per foot, is unreeled behind a tape-laying machine that both digs the furrow and covers it behind the in-place tape. In relation to the growing cotton plants, the tape is buried almost directly below the seed row. For the 1981 tests, runs extended 600 feet.

Seed of the Deltapine varieties DP 61 and DP 41 was planted at a rate of 15 pounds per acre. "We had emergence in just four days," says Tollefson, accounting for it by the fact sub-surface release of water reduced evaporative cooling of the soil in the seed zone.

Tollefson foresees that underground release of water will eventually reduce germination of weed seeds. He has already concluded that a comparative lack of humidity has reduced populations of insects, both good and bad. "We had double the insect pressure in our furrow-irrigated cotton," he says.

Here are results from Wuertz's 1981 "test plots"—four 2.7-acre plantings watered by drip systems from different control valves, plus a furrow-irrigated, "check" plot of 2.7 acres (Yield figures combine two pickings and a salvage operation.):

Valve I – Variety: DP 61. Yield averaged 4.6 bales per acre. That means 6.7 acre-inches of water and 17.4 units of nitrogen fertilizer produced one bale of cotton.

Valve II – Variety: DP 41. Yield: 4.71 bales per acre, meaning 6.62 acre-inches of water and 17.19 units of nitrogen per bale.

Valve VIII – Variety: DP 61. Yield: 4.41 bales per acre, meaning 7.0 acre-inches of water and 20.5 units of nitrogen per bale.

Valve IV – Variety: DP 61. In this plot, the tape was spaced 80 inches apart with centers in the bottom of alternate furrows. Total water use was higher than in other drip plots, 51.3 acre-inches. Yield was lower, 3.66 bales per acre, which comes to 14 acre-inches of water and 17.21 units of nitrogen per bale. "This system is 'out' for '82," says Wuertz.

"Check" plot – Variety: DP 61. Yield: 4.3 bales per acre, using 19.78 acre-inches of water and 36.98 units of nitrogen per bale. In a 3.3-acre adjoining plot with conventional furrow irrigation, yield averaged 3.87 bales per acre, using 22 acre-inches of water and 41.09 units of nitrogen per bale.

Wuertz has big plans afoot for drip irrigation in the 1982 growing season. In addition to expanding to 170 acres with the buried drip tape, M and W Farms will try the Israeli drip system in 10 other acres. With that system, as irrigation time approaches, drip tape is rolled out on the soil surface, then it is reeled back in before mechanical pickers lumber into the field at season's end.

Wuertz at the computerized control board for his drip irrigation system.