

CROP HISTORY

SOIL TYPE: Elfrida Silty Clay loam, (Ef)
PREVIOUS CROP: 1980 Lettuce. 1981 Fallow
TILLAGE: Disc, list, and bed shaped before planting.
PLANTING: May 15th with 19 lbs/A.
HERBICIDE: Treflan at 1 pint/A and double discing to incorporate to a depth of 3"-5".
FUNGICIDE: Tree aerial applications for rust.
FERTILIZER: Broadcast 10-52-0 at 225 lbs/A, preplant. Water run UN 32 for additional 82.8 lbs actual N
IRRIGATION: Started irrigating May 19th, finished 1st irrigation on May 25. Total water 11.88 acre inches.
RAINFALL: July (0.6 in.) - Aug. (4.3 in.) - Sept. (2.75 in) - Total = 7.65 in.
INSECTICIDE: None
AMENDMENTS: 10 gal. Sulpheric acid Aug. 5th for Algae

Variable discharge in some T-TAPE lateral lines required replacement of those lines on Aug. 11th.

First bloom July 16th, 54 days after planting.

Low-Pressure, Mechanically Moved Irrigation Systems for Cotton

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SUMMARY

Low-pressure, continuously moving, mechanical irrigation systems were used to irrigate cotton at the University of Arizona Marana Farm in 1982. Cotton yields ranged from 2.30 to 2.55 bales per acre. Water applied ranged from 28 to 30 inches during the season. These systems offer an efficient alternative for cotton irrigation.

Two continuously moving, mechanical irrigation systems were used to irrigate cotton at the University of Arizona Marana Farm during 1982. These systems were modified to operate at low pressures to minimize the energy requirement. A system with laterals 1300 feet long would require 20-25 psi with the low pressure design.

A 550 foot center pivot was used in the first field (E-1). Two sections, 20 rows wide, were irrigated using low pressure spray nozzles mounted about 5 feet above the soil surface on drop lines. The rest of the system was irrigated with furrow drop lines. These consisted of a flow control nozzle, and a plastic tube which delivered water directly to the bottom of every other furrow. Checks or small dams were mechanically placed 6-10 feet apart in every furrow. These hold the irrigation water so no runoff occurs and assures a uniform water distribution. Checks were installed four times. The checks were installed in every other furrow where furrow drop lines existed so that the main picker wheels travel where there are no checks.

The field was fertilized, listed and a pre-irrigation of about 8 inches applied between March 30 and April 7. Delta and Pine 55 was planted April 21. Wheel tracks for each irrigation system were elevated to avoid traction problems.

Additional fertilizer was applied once during the season when petiole samples indicated the need. Urea was applied in the irrigation water at a rate of 30 lbs N per acre in the furrow drop areas and 15 lbs N per acre in the spray area. Petiole samples showed 6,252 ppm of NO_3 on July 7, 6,225 ppm July 14, and 12,594 ppm July 30 in the furrow drop areas. The spray nozzle areas showed 6,252 ppm July 7, 14,360 ppm July 14, and 9,228 ppm July 30.

The total water applications and cotton yields are shown in Table 1. The cotton was picked on November 4 and December 20.

Table 1

Water applied and lint yields obtained by irrigation with sprays and furrow drops in Field E-1, Marana Farm, 1982.

Irrigation Method	Water Applied *inches	First Pick bales/acre	Second Pick bales/acre	Total Yield bales/acre
Sprays	29.4	2.33	.13	2.46
Furrow Drops	30.1	2.14	.18	2.32

* 6.72 inches of rainfall occurred during the season and is not included in the water applied.

The last irrigation by the sprays was applied September 7. The last irrigation by the furrow drops was applied September 8.

A 550 foot linear or lateral move system was used in the second field (E-2). Low pressure sprays were used on the south 2 spans during pre-irrigation and about the first month of the season. Furrow drops in every furrow were used on the north span and overhang during pre-irrigation and the first month of the season. Uniform water applications while simultaneously irrigating with both sprays and drops was not satisfactory.

The remainder of the season furrow drops were used in every other furrow on the entire system. Checks were installed four times, with the last installation in every other furrow. Wheel tracks were elevated to avoid traction problems.

The field was prepared similar to E-1. A pre-irrigation of about 9 inches was applied and planting was on May 13, also with Delta and Pine 55.

No additional fertilizer was applied during the growing season. Petiole samples showed 26,902 ppm NO₃ July 7 and 23,500 ppm July 14.

Table 2 shows the water applied and lint yields. The cotton was picked November 1 and December 20.

Table 2

Water applied and lint yields obtained by irrigation with sprays and furrow drops in Field E-2, Marana Farm, 1982.

	Water Applied *inches	First Pick bales/acre	Second Pick bales/acre	Total Yield bales/acre
South 2 spans	29.6	2.36	.15	2.51
North span and overhang	28.4	2.37	.17	2.54

* 6.72 inches of rainfall occurred during the season and is not included in the water applied.

These systems have the advantages of being able to apply water uniformly and at an amount and frequency to meet crop needs. They offer some of the advantages of drip irrigation without the disadvantages of having tubing spread over the field. The yields were up to one-half bale per acre more than typical furrow irrigated cotton while water usage was reduced by one acre-foot per acre or more.

A disadvantage is the need for furrow checks to hold the water where it is applied. Check erosion was controlled with specially developed flow diverters attached at the end of the furrow drop tubes.