

APPLICATION OF WATER ON THE CONTOUR
IN THE PECOS VALLEY

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Research has determined that on sloping fields up to 40 percent more land may be irrigated with a given amount of water using contoured rows rather than straight down-slope rows. Contouring of row crop furrows can furnish for sloping fields the efficiency of water use attained by bench leveled land at only a fraction of the capital investment outlay.

In that we have utilized contoured furrows for row crops on our Pecos Valley farm for many years, I'd like to briefly mention some of their benefits and some of their shortcomings.

To begin with the right circumstances to justify their use probably need to be present--such conditions as:

1. Soil too shallow to permit bench leveling, or
2. Capital too limited to permit the expense of land leveling, or
3. Desire not to disturb the topsoil and thereby lose its fertility for several years.

A glance at my first chart, a topographic map of one quadrant of our farm, shows a condition where contour furrows have been beneficially used. The steep and irregular topography of the land will be seen in the many contour lines shown in black solid lines. The soils here are light in character and vary from deep to shallow and rocky, and therefore do not lend themselves to bench leveling. By using contoured furrows on this land, we have been able to produce yields equal to those on our more level fields. I have drawn in a few typical row patterns as they might lie on a contoured furrow layout of this field. Shown in (----) are the through rows reaching from the head ditch to the fields' end while the nonthrough point rows are shown in (....).

Our local SCS officer at Artesia, Mr. Bob Bishop, has made some studies on the efficiency of the contoured rows on our farm. The next charts show his results. Chart 2 demonstrates the very efficient water intake during an August irrigation of cotton on contoured rows 1200 feet long. He estimated that 3 inches of water was needed at this irrigation as indicated on the chart. By measuring the water flow at 100-foot intervals away from the head ditch, he determined the intake at such intervals. The very uniform water intake curve is indicated by the other line on the chart. The small amount of water wasted is indicated by the hatched area.

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CHART 1.

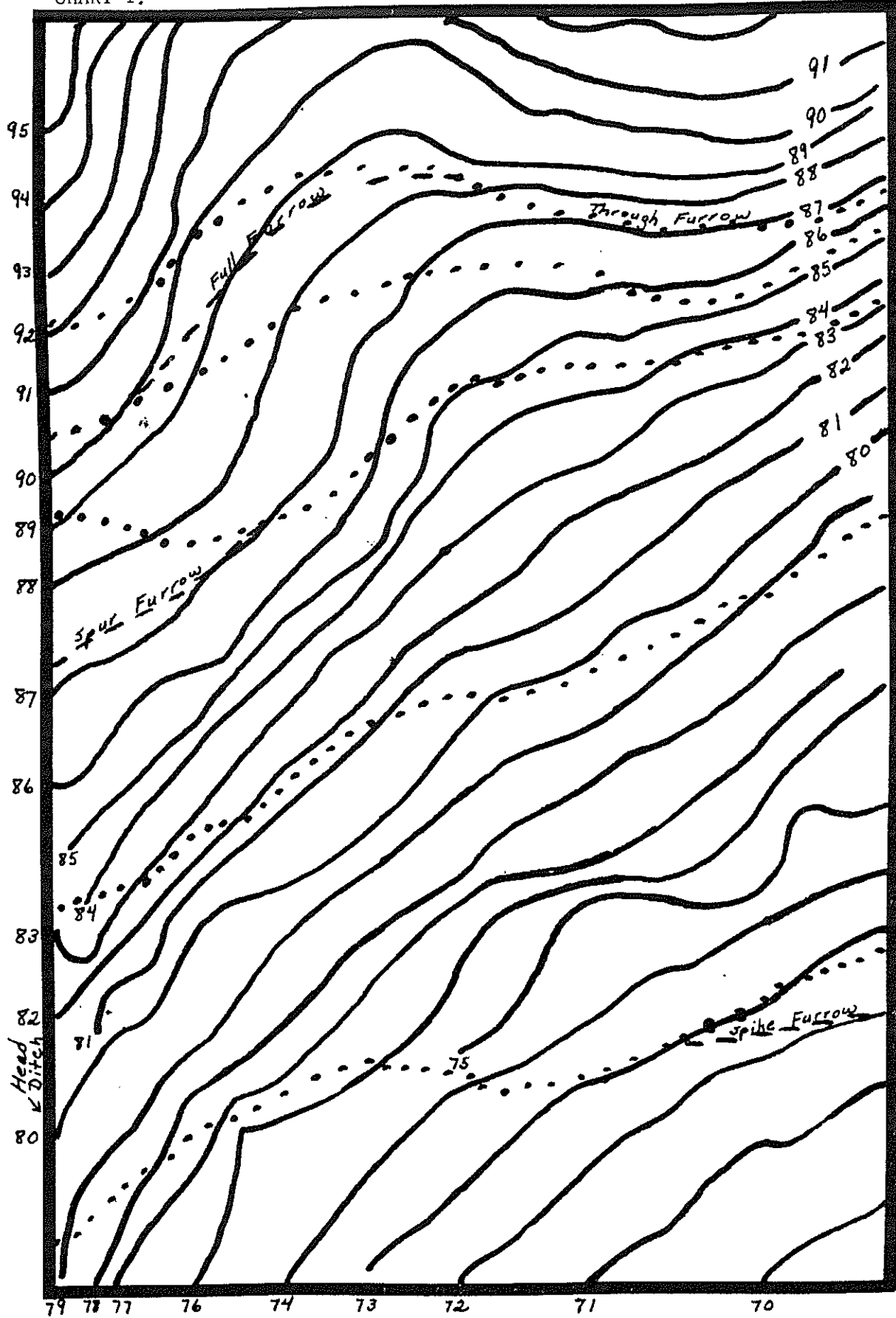


CHART 2. Moisture Distribution

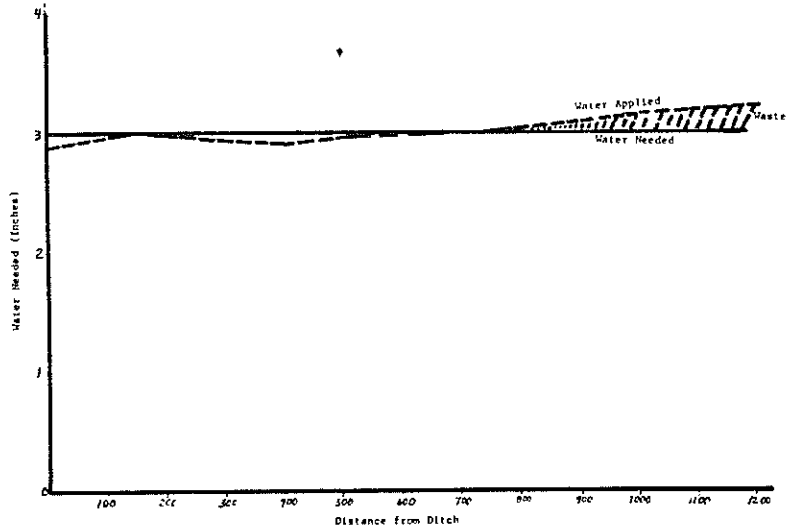


CHART 3. Moisture Distribution

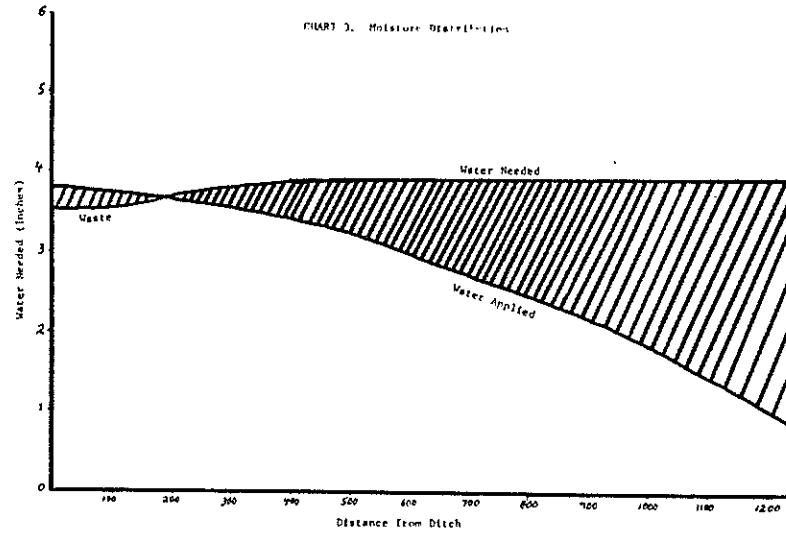


CHART 4. Time Water Running in Furrow

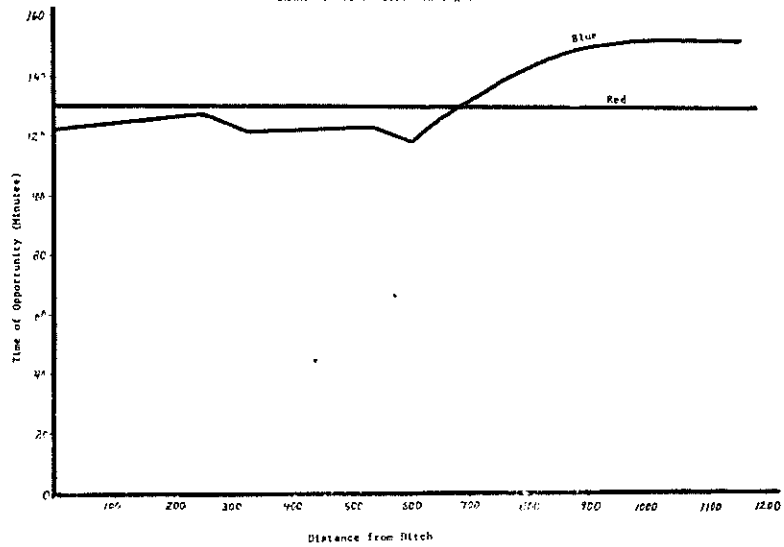
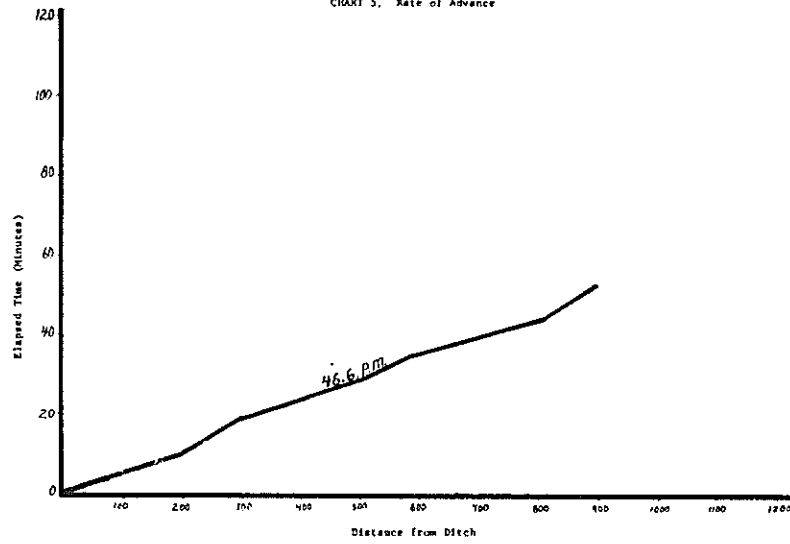


CHART 5. Rate of Advance



In contrast to this efficient irrigation on rather steeply sloping land is the following chart, Chart 3 which indicates the ineffectiveness of an irrigation using down the slope rows on a field of similar grade. Again, these measurements were made by Mr. Bishop in rows of about 1200-foot length. As is seen from the chart, the water applied varied from nearly 4 inches at the row's head down to less than 1 inch near the row's end. The large hatched area indicates the water still needed.

On Chart 4 is indicated the span of time that water was standing in each 100-foot segment of row. We estimated that each set needed to remain 125 minutes or approximately 2 hours in order to apply the 3 inches needed of moisture, as is shown by the red marked line. The blue line indicates the amount of time that water actually was running in the furrow, and as is seen it nearly equalled the planned figure.

On the next chart is shown the rate of advance of the water down the furrows. From it will be seen that a 46-gallon per minute head in a furrow had run 750 feet down the row in 40 minutes on a sandy loam soil. Each farmer using contour row needs to work out his own plan for row gradient for his own type soil and for the kind of crop that he is planting. The use of siphon tubes to lift water to the furrow from the ditch provides the irrigator with considerable leeway in that he may use many or only a few tubes to furnish the necessary head to give the desired penetration. One of the disadvantages of using a contour row lay-out is that since the water is carried across the slope of the field, the head ditch from which the water is taken often needs to be run down slope necessitating the use of special equipment, such as either gated distribution pipe, or else several scissors tarps together with siphon tubes to prevent eroding of the ditch.

To summarize contour-furrowing of row crops provides a low cost means of efficient water application. The practice could fulfill a water saving role in our water-short state and will probably be more widely used whenever it becomes economically profitable to do so. The extra planning time required for the row lay-out and the some time extra labor needed for irrigation, may be more than compensated for by extra yield, by higher quality or by disease-free crops. The equipment needed for engineering the layout should cost less than a hundred dollars and could be operated by any farmer.