CONTRIBUTING EDITOR

Allan Humpherys

A new technique for conserving water

Agricultural researchers are continually looking for ways to conserve farm water supplies so as to make best use of the water we have.

As our knowledge of soils and plants increases and as we learn more about the effects of the field environment and cultural treatments on plant growth and production, we will need to modify present tillage, irrigation, and cultural practices to take advantage of new concepts.

Highly mechanized irrigation systems are being developed and used today that provide a greater capability for supplying water at the right time, in the right amount and in the right manner for best plant growth, and best water conservation.

A practice getting recent attention consists of using short, frequent irrigations which vary from daily irrigations to irrigating every two or three days.

Beans growing in the furrow of a within-row irrigated field

Correspondingly smaller amounts of water are applied each irrigation to maintain a high soil moisture level in the root zone. This high-frequency irrigation technique is being studied by researchers at the Salinity Laboratory in Riverside, California for salinity control.

Another promising management practice using short, frequent irrigations is that of controlled "within-row" irrigation being studied by Warren Rasmussen and Robert Worstell at the Snake River Conservation Research

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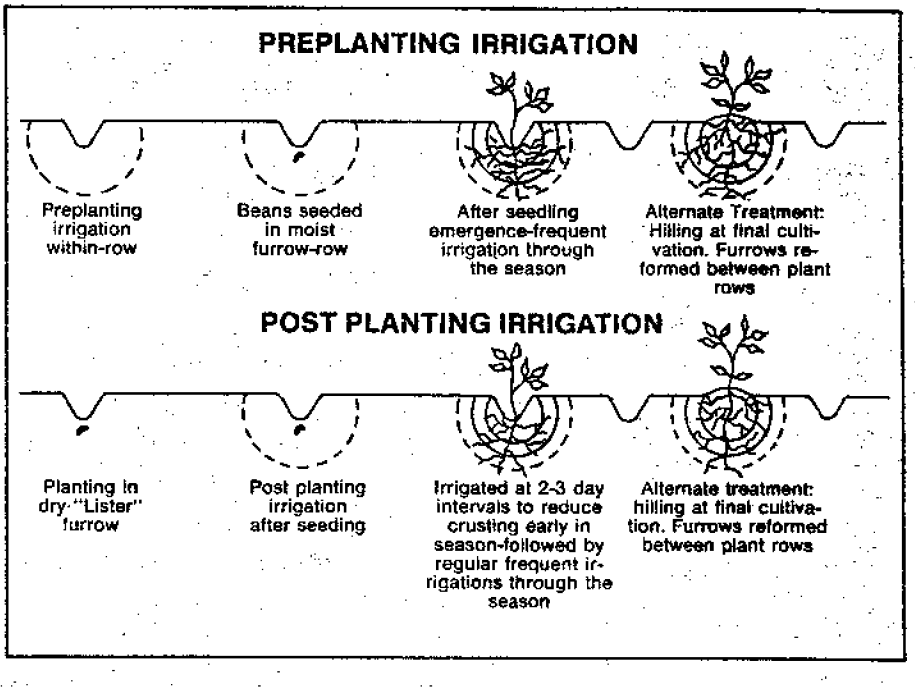
1/ Allan Humpherys is an agricultural engineer, Snake River Conservation Research Center, Kimberly, Idaho 83341



A new technique

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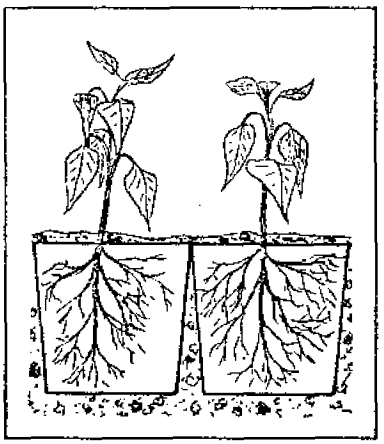

Center, Kimberly, Idaho. They are using this technique to conserve water and to reduce erosion, particularly where beans are grown.

Because beans are planted late in the season to avoid frost, irrigation is needed in this semi-arid climate to provide moisture for germination. With conventional cultural practices it is not uncommon to wet the entire soil profile, applying as much as 12 inches of water during the preplant irrigation. Much of this water is lost to deep percolation and evaporation which also cools the seed bed. Because the soil is usually loose, it is susceptible to erosion and, with long runs which require larger streams, considerable erosion can occur.

With Rasmussen's and Worstell's technique, both preplant and post-plant irrigations are applied within the seed row. During the past three years, beans were planted in small lister type furrows that are similar to corrugations. During the preplant irrigation, water was applied in these small preformed furrows for 1 to 2 hours. This wetted an area 6 to 8 inches wide and 8 to 10 inches deep below the furrow.

The water was applied with a multi-set surface irrigation system which permits the application of small quantities of water at controlled rates to short furrow lengths. Since only a relatively small volume of soil in the seed bed was wet, the average depth of water applied was only about 1.5 inches or about ⅛ of that used in conventional preplant irrigation. The beans were seeded with an ordinary surface planter directly in the prewet furrow two to three days after this irrigation. Within-row irrigation is illustrated in Figure 1 where one treatment consisted of reforming the furrows between the plant rows later in the season. Beans growing in the shallow furrow of a recently irrigated plot are shown in Figure 2. Excellent stands of beans were obtained by this method.

In the post-planting irrigation treatments, beans were seeded in the small dry preformed furrows and then irrigation water was applied for 1 to 2 hours directly over the planted bean seeds. Even though short irrigations of 1 to 2 hours were applied every two to three days to soften the crust over the bean rows, the stand was reduced because of the severe crusting which is characteristic of the Portneuf silt loam soil. With other crops and soils, this may not be as great a problem when post-planting irrigation is used.

The results from Rasmussen's and Worstell's tests showed that controlled, preplant, within-row irrigation used in conjunction with a multi-set surface system reduced the amount of water used by 30% to 50% compared to the check treatments.

Soil losses from the field were also significantly reduced. A total of 22 to 28 inches of water were applied to the soil with 8 to 10 conventional irrigations during each season, compared to only 12 to 14 inches applied with 10 to 14 light, frequent, within-row irrigations. The small applications of ½ to 1 inch of water per irrigation should greatly reduce water runoff and erosion.

The researchers state that cultural treatments using preplant within-row irrigation have produced plant growth and yields comparable to those obtained from the check treatments using conventional practices. Part of the water savings are attributed to use of the multi-set system of irrigation. Within-row irrigation in conventional systems having longer irrigation runs would reduce water use and erosion but by a smaller amount than in these tests.

Besides reducing water use, runoff, furrow erosion and soil loss, this new practice may have other advantages. Soil temperatures early in the season should be highly because a smaller volume of soil is wetted in the early irrigations. Maintaining a relatively high, more constant, soil moisture in the upper root zone enhances root activity in the surface soil where most of the soil and fertilizer nutrients are located. Also, excessive irrigations are avoided, thus reducing nitrogen losses by leaching. Using less water can represent significant economic savings where water is pumped and is scarce or high in cost.

These and other new management and cultural practices involving irrigation invariably will require greater control of the irrigation water and will place increased demands upon the farm irrigation system. Some of these improved practices may not be feasible and will not be fully utilized without an up-dated mechanized irrigation system using automation. Thus, when considering changes in an irrigation system, consider its ability to adapt to improved practices and techniques that may be developed.