EFFICIENT USE OF IRRIGATION WATER

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The use of water in irrigation is for the purpose of producing crops. Just that simple at the first glance! So just apply the proper amount to the plot and move on. Yet as we try to determine just what is the proper amount we are confronted with many variable factors that influence its use that we wonder if we have enough known quantities to solve for the unknown.

Among the factors contributing to inefficient use of water is the actual irrigating is generally done by some incompetent workman, who is only on the job for the pay, with the result he either cuts the water off too soon leaving areas half dry or lets it run too long and floods the field. Either way the crop is hurt for too much water at one time is about as harmful as too little. You can add more if too little but you can't do anything about too much after the application. So we suggest it would be most profitable for the farmer to do his own irrigating and if this is not feasible to hire competent irrigators.

Agriculture, whether we like it or not, has been forced into mechanization and the trend is to larger and larger machines to minimize the high cost of labor. Naturally, the longer the irrigations the more efficient is the use of this equipment. Many times other factors are not considered with the result that the production of crops is actually decreased by the excess application of water in certain areas of the plot.

To our mind, the most disturbing of these unknown quantities is the variation of soil textures, ranging from adobe clay which is practically impervious to absorbing more water after it is saturated, to river bed sand which is so permeable it will continue to absorb water as long as the water is poured on it. Of course, some plots have uniform soil and the problem becomes much simpler than in a plot that has various soil textures.

These are only some of the variables, we do not presume to know all of them. So let us consider the ill effects of the application of water to these different types of soils. Our experience has been that the adobe lands are lacking in drainage with the result that excess water dries up by evaporation causing a baked crust. Such a dry, hard crust on top with mud underneath will not germinate seed;

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the soil must be pliable. To illustrate, we had such a plot of land with about 18 inches of adobe on top underlaid with silt. As long as we rotated with alfalfa we had their top roots growing through the adobe into the silt which furnished drainage until they sealed up. For years we were not troubled with baked soils. Then the State University recommended rotation with barley in order to minimize the effect of wilt in cotton production. We lost our drainage in time and found it impossible to sprout a stand of healthy cotton plants. We then transfered the adobe on a 100 foot strip across the lower end of the irrigation for silt soil from an adjoining plot. We have had no more trouble getting any seed we plant to germinate. We relieved another block by digging two 10 foot trenches across the end of the irrigation schedule and filled them with river bed sand so that any excess water would drain into the basin below.

On the Salem farm we had the end of an irrigation on some highly permeable soil one foot in depth underlaid with river bed sand. We stockpiled the top soil from a strip 30 feet wide and replaced some six inches of the sand with a like amount of adobe, mixing them with a breaking plow. We continued this procedure across the area replacing the top soil. Originally this area would not pay the expenses of operation but after adding the adobe it has been producing comparable crops to the rest of the field.

On another hundred acre block we originally irrigated from the adjacent lateral toward a drainage ditch. Some of these soils were adobe, some silt fairly tight and some highly permeable. In time we found the production going down fast in the permeable areas so we changed the farm ditches in order to segregate the different soils into shorter irrigations. In two years without any extra fertilization these permeable soils were producing crops equal to the other areas in the field. We were simply leaching the fertility of this area into the basin below. Incidentally, the change cut the amount of water to irrigate the entire field by one third. Plant food to be available to plants must be soluble and the more you leach the soil the less fertility you have available for production.

These are some of the remedies we have used and we are certain there are many others. We would be so bold as to suggest that every farmer study his irrigations and where feasible construct his farm ditches on the tighter soils and if he cannot segregate his plots into uniform soil to recondition the permeable areas so that they will be productive and at the same time use less water. When we consider there is not 10 percent profit in farming we are convinced you cannot support unprofitable acres in any irrigation project.

To show that this leaching process is not confined to just an occasional acreage let us consider some Bureau of Reclamation figures

here in the Rio Grande Project because we think the same conditions prevail generally in other river irrigation projects in the state. For that period of years until 1951 when there was ample supply of water in the Elephant Butte Reservoir and no pumping from the underground basin, the Bureau measured some 300,000 acre feet of drain returns to the river yearly. The river bed seepage has been estimated at about 15% of the release from the dam which at that time ranged from 720,000 acre feet upward and in only one year did the release amount to 800,000. So, for the sake of computation let us take an average of 760,000 acre feet release. The river seepage would then be 114,000 acre feet. The distribution losses in the canal are estimated 20% or 152,000 acre feet, but we know all of this is not seepage as a considerable portion was leaky turnouts, growing vegetation such as willows, johnson grass, etc., on the banks. We would estimate about 50% seepage or 76,000 acre feet. Adding this to the river loss we would have 190,000 acre feet, leaving a net seepage through areas in the field of 110,000 acre feet of water. This seeping water hurt production of crops by leaching. If you take the irrigation records of the use of water for all crops at three acre feet per acre this is enough water to have irrigated some 36,666 more acres.

We are sure some of you are thinking of the old quip, "Figures don't lie but liars can figure". He tells us that this water is returned to the river and used again. Where then is the loss? The answer is that during this period of ample water supply the Bureau, in test wells scattered over the project showed the elevation of the water table in the basin to be two feet higher in September at the end of the irrigation season than it was the next March when started again. Then during the drought when wells were operated to supplement the surface irrigations from the canals, and the amount of water that was pumped to produce the crops that were grown, and the effect it had upon the elevation of the water table, gives one a guess that approximately this two foot buildup during the season, draining out each winter, represented 100,000 acre feet of water. So the figures do reconcile within a reasonable degree.

During the drought the Irrigation Board of Directors of the Elephant Butte Irrigation District heard a lot of agitation to concrete the river and canal system to save water. We will admit that it would have made deliveries more prompt and more efficient but not any saving of water. We are afraid the advocates of that approach were only considering the surface supply and overlooking the fact that whether we like it or not the river is going to support this underground basin and if we lowered the water table by removing the seepage from the river and canals we would merely transfer the filling of the resulting void in the basin through the fields. Draining below, evaporating above requires more frequent and heavier irrigations to produce crops with the resulting loss in fertility caused by leaching. This was definitely proven during

the drought when our efficiency of delivery dropped from a normal of 65% to 19% one year.

Besides, Colorado has expanded the diversion of water from the Rio Grande River until they have an accumulated debit since 1951 of over 900,000 acre feet with an allowable debit of 100,000 acre feet under the Rio Grande Compact. The State of New Mexico with an allowable debit of 200,000 acre feet has a debit of 450,000 acre feet. The Rio Grande Compact was entered into in 1938 by Colorado, New Mexico and Texas to divide the water of the basin between the three states and therefore is either an enforceable contract or meaningless words. If the latter, then what do we want with concreted river and canals with no water to run in them?

The Carlsbad Irrigation District has a different problem, a fan of salt cedars in front of McMillan Lake estimated to cover some 30,000 acres. The Lake is necessary for terminal storage in order to successfully irrigate the project and if the cedars are removed the Lake will silt up. What is the solution of the problem? The project hasn't sufficient water to support their irrigation and the consumption of water by the salt cedars.

The State of New Mexico in cooperation with the Bureau of Reclamation has eliminated 5,000 acres of salt cedars between Elephant Butte and Caballo lake with an estimated saving of 15,000 acre feet per annum in the transfer of water in this distance of some seventeen miles. The same organizations are now clearing salt cedars from the San Acacia Dam north to Bernado for the conservation of water.

When we look at the record that only about fifty percent of the water entering the streams in this state are beneficially used and half of it escapes in evaporation, growing worthless vegetation, frog ponds, mosquito dens, etc., we believe we should make every effort to reduce this waste in every feasible way. For, with the expanded uses of water and increased population the development of the economy of the state is limited to and by the availability of water for whatever trend the economy may take. Consequently, we should all cooperate and try to be more efficient in the use of the available water whether urban or rural. We farmers should fully realize that if the day comes when the shortage of water forces the price higher the irrigated farming will be the least able to buy.

The State of New Mexico through its agency the Interstate Streams Commission has set the price of water in the Ute Creek Reservoir on the Canadian River at three cents per 1,000 gallons in the lake. That is approximately $10.00 per acre foot. Even farming in the

Mesilla Valley could not pay such a price for water in Elephant Butte Lake. Yet as you from the East side know, the Bureau of Reclamation is making a survey as to the feasibility of a pipeline to make this water available for municipal use in several cities in Eastern New Mexico. Not the price of water but feasibility of the pipeline will determine whether or not it is constructed.

It is evident that the acute problem for both urban and rural areas is the shortage of water, for the economy of any town in a farming area depends upon a profitable agriculture. We sincerely hope we have presented some of the water problems that confront all of us. Also a few helpful suggestions to minimize the inefficient use of water.