

The Benefits of Surge

by Valerie Moody, Irrigation Journal, March 1993

The farmer of the 1990s is under enormous pressure on three major fronts; crop protection, water availability and water quality. Availability is affected by dropping water tables, droughts and an ever-increasing demand for water from urban populations. Water quality, on the other hand, is likely to be enforced by governments which mandate the farmer to keep chemicals out of rivers, streams and groundwater. Runoff of irrigation water, deep percolation, and drainage are major challenges for farmers in complying with these rules.

The irrigator strives to use less water, apply it more evenly, reduce deep percolation and control drainage and runoff. At the same time, farmers must control labor and energy costs and/or switch to higher value crops. These goals have been difficult to achieve with surface irrigation.

For the farmer who is unable to shift to higher-dollar crops or who cannot justify the capital investment of some irrigation technology, surge irrigation offers hope. This type of irrigation has produced equal or better yields with 30 percent to 50 percent less water. Surge also reduces runoff, deep percolation and drainage.

The cost of adding surge to fields with gated pipe already in place is as little as \$12/acre. For those fields without gated pipe and associated equipment, the cost approaches \$50/acre.

Following a four-year study, researchers in Washington (Evans, Proebsting, Mahan) found that surge is potentially a low cost alternative to solid-set microirrigation or sprinkler systems in widely-spaced perennial crops. Efficiencies of high frequency surge irrigation on trees were reported up to 80 percent. The benefits, they said, could be extended to many crops that cannot justify the expense of a pressurized solid-set system.

Furthermore, fertigation through a surge valve increased corn yield by 12 percent in tests at Colorado State University. Researchers found more residual nitrogen in the upper two feet of the soil profile at the end of the season and a decrease in the amount of nitrates carried into the groundwater.

Similarly, the researchers reported that surge irrigation is effective in avoiding deep percolation losses of irrigation and salt loading into the Colorado River. According to Dr. Mahbub Alam, CSU cooperative extension agent, salt load reduction is directly related to reducing the deep percolation of water through Mancos Shale. Studies on a large number of valves showed that deep percolation was reduced by about 50 percent with surge. Alam estimated that surge resulted in a salt load reduction of 2,528 tons for the summer of 1992 in the Lower Gunnison Basin Salinity Control Project.

Studies in 1991 at Oregon State University found that surge irrigation required less than half the water needed for conventional surface irrigation to produce equivalent wheat yields. Miller, Shock, Stieber, and Saunders reported that surge-irrigated furrows finished more uniformly and with comparable yield, even though the surge fields received 12.9 acre/inches of water to 28.2 acre/inches for the conventional field.

Editor's Note: Valerie Moody is a marketing and public relations specialist for P&R Surge Systems, Inc., of Lubbock, TX.