20. SURGE IRRIGATION

Even advanced pressure irrigation methods, such as drip and sprinkler systems are in vogue the traditional gravity surface irrigation methods still remain inevitable due to their simplicity in layouts and low installation and operational expenses. However the short strip furrow and check basin layouts (the primary surface irrigation methods in Tamilnadu) warrant division of the irrigated fields into a number of square or rectangular (2 m x 2 m to 6 m x 6 m) plots encompassed by criss- cross ridges and feeder channels for facilitating irrigation flow from head to tail end of the field. This eventually results in prolonged irrigation application time and reduced irrigation efficiencies of 55 - 65% only due to excessive seepage, deep percolation and runoff losses (35-45%). Besides, the criss- cross layout with cross ridges and feeder channels leads to land loss of 15 -25%. In view of minimizing the land and water loss and to accomplish high level of irrigation and water use efficiencies a relatively new surface irrigation method called “surge irrigation” was introduced in TNAU with extensive experimental trials on it’s hydraulic performance evaluation and crop compatibility during 1992-95.

Features of Surge irrigation

The term “ Surge irrigation” refers to the delivering irrigation flows into individual long furrows (more than 25 m upto 200 m) in an intermittent fashion of predetermined ON-OFF time cycles (5 minute to 10 minutes) with the design duration of irrigation. During the ON time water front advances into the furrow over a certain length and during the subsequent OFF time the water applied partially saturates the soil and infiltration rate gets reduced on the advanced length. When water is delivered in the succeeding ON time, the water front advance gets accelerated due to the reduced intake rate and eventually it reaches the tail end of long furrow with in 30 - 50% of the design duration of irrigation. This process of ON-OFF water supply and cutoff results in highly minimized deep percolation and runoff losses (hardly exceeding 20%). Hence, high uniformity of soil moisture distribution with in the effective root zone is achieved over the entire furrow length resulting in enhanced irrigation efficiencies of more than 85% to 95%. In addition due to the series of long furrows emanating from a single head channel, the criss - cross ridges and feeder channel of division are eliminated thereby limiting the land loss within 5% only.

Contributions of TNAU in surge irrigation research

- Manual semi automated and automated surge irrigation layouts were designed and the irrigation parameters such as the individual furrow discharges (30 lit/min to 120 lit/min), surge cycle ON-OFF times (5 min to 30 min), surge cycle ratio (0.25 to 0.66), furrow gradients (0.1% to 0.6%), furrow size (30-120cm) and furrow length (50-200m) could be optimized through mathematical models.

- A significant contribution from TNAU is the development of an original emprical model for the prediction of waterfront advance times and resulting in irrigation water distribution efficiencies.

Soil suitability	:	Sandy clay loam and loamy soils only
		Crops tested maize sunflower and sorghum
Water saving	:	25-40%
Land saving	:	15-25%
Labour saving	:	40%

Limitations

Surge irrigation systems do not show marked differences in land and water saving in extremely clay or sandy soils. Besides, surge irrigation technology is still in the infant stage in India and requires popularization through extension methods.