SURGE IRRIGATION FOR SUGARCANE

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Irrigation is the prime mover in Agriculture increasing the productivity. However the availability of water is decreasing day by day because of increase in population and industrialization. Therefore the available water for Agriculture should be judiciously utilized without reduction in yield. In such a sitution surge inrrigation has come as a boon for the shallow rooted furrow crops.

Surge irrigation is new method of furrow irrigation wherein the water is let in the long furrows intermittently with series of ON and OFF timings with same or differential time span. The advantage of the surge flow is uniform wetting from the head to the tail end of the furrows avoiding deep percolation throughout furrow length thereby saving water and energy. In addition to the above advantages there is land and labour saving.

Mechanism of surge effect

In pulsed flow (surge flow) the advance is faster resulting in uniform wetting from head to the tail end of the furrows, because of one or more of the following reasons.

1. During the OFF time the surface soil is consolidated as negative hydraulic gradient develops in soil water.
2. The cracks gets filled which are found in the furrow bed when the flow is interrupted.
3. Soil sediments seal the furrow bed.
4. There is complete disintegration of soil particles in the wetted perimeter as a result of faster wetting.
5. The clay particles expand due to hydration and
6. Air entrapment.

Method of surge irrigation

2.5" dia to 1.5' length PVC pipes should be buried at the head of each row. This will serve as the inlet pipe for the irrigation water. A stopper should be provided for each inlet pipe for facilitating easy closing and opening operation. The water is allowed from the main channel to the field channel where the inlet pipes are buried at the uniform height. (fig.1). At a time water can be allowed in 5 to 10 rows. After the completion of ON time say 10 or 15 minutes other 5-10 rows can be opened depending upon the quantity of water, i.e., flowing through the field channel. Approximately 1.5 to 2 lps can be allowed to pass through each row. Again after 10 minutes water should be let in in the first 5-10 rows where partial wetting had taken after closing other 5 rows. Thus irrigation has to be provided alternatively till the water reaches the end of the furrows where we say the advance is complete. Each time when we allow water for a fixed time (say 10 or 15 minutes) is called one surge According to USDA a minimum of 4 surges should be there to give real surge effect. However even after completion of the advance when required quantity of water for the particular crop was not given, then we can go in for post stage irrigation, where water is allowed to flow in the rows at half the rate of the previous flow either continuously or intermittently till the water reaches the tail end of the furrow.

Study on surge irrigation for sunflower and maize has been tried at TNAU Coimbatore, which proved beyond doubt that a fair quantity (15-30%) can be saved without any major initial investment and giving a yield on par with conventional methods of irrigation. By adopting surge irrigation for sugarcane approximately 30% of water can be saved by avoiding the deep percolation losses (Fig.2).

Surge irrigation for sugarcane

The pre-requisites for surge irrgation are that the crops should have shallow root system, should be grown in ridges and furrows. The minimum length of the furrow should be 100m and a mild slope is required to have surge effect. Mariam and Kellen, 1978 defined three performances required to evaluate any irrigation system. a) potential application

efficiency b) actual application efficiency c) distribution efficiency. Kellen and slack (1987) reported that, with the same volume of water in surge irrigation, the water would advance further along the furrows than continuous flow, because of this there was reduction in runoff which improved the uniformity and application efficency. According to Goldharmmer et al., (1987) the surging increase the average distribution uniformity from 63 to 78 per cent Stringham (1988) opined that surge irrigation had the potential to increase surface irrigation efficiency to levels usually associated only with sprinkler or trickler irrigation.

In South India sugarcane is irrigated crop which requires large quantity of water i.e.>2000 mm, which should be applied throughout the growing season. General method of irrigation for sugarcane is providing water in furrows of 6-10 m length where a large quantity of water has to be provided to meet the water requirement. Since sugarcane is a shallow rooted crop a soil wetting of 60 cm depth will be sufficient to provide the required water. However by providing the irrigation in the conventional method a considerable amount will be wasted which will go as deep percolation loss. By this not only the water is lost but also the water soluble nutrients required for the sugarcane will be waste. By adopting surge irrigation a remedial measure can be found out to overcome the above said disadvantages. Surging increases distribution uniformity resulting in 58 and 80 per cent reduction in deep percolation.

Surge irrigation, reduces irrigation time by 30 per cent and also amount of water used by 30 per cent in silt loam soil. The land utilized in the formation of cross channels and bunds will be saved to a tune of 10 to 15 per cent. A saving of 25 to 30 per cent energy in terms of labour for irrigation can be achieved. ❑

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AZOLLA WITH INORGANIC NITROGEN

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Azolla sp. is an important biofertilizer which helps in conserving the Inorganic nitrogenous fertilizer upto 25 percent. Though six species of Azolla are prevalent, *Azolla microphylla* performs well in the Cauvery Delta Zone (CDZ) owing to its temperature tolerant nature, quicker adaptability and greater multiplication rate. A trial was laid out in the farmer's holding at Vandaiyariruppu village in Thanjavur district during Samba season of 1995-96 to study the extent to which the inorganic nitrogenous fertilizer could be replaced by biofertilizers without sacrificing the yield. Treatments followed were T1 Control (no nitrogenous fertilizer or biofertilizer application) T2-Azolla application (500 kg/ha) T3-60 kg N/ha (Urea -130 kg/ha), T4-60 kg N ha + 500 kg Azolla/ha and T5 - 100 kg N/ha (Urea - 217 kg/ha).

In all the experimental plots, but for Nitrogen, Phosphorous and Potash were applied at the recommended level (50 kg P_2O_5, 50 kg K/ha). The variety planted was ADT 39. The results revealed that application of Azolla (500 kg/ha) with Urea (130 kg/ha) had yielded 6313 kg/ha. Other treatments have yielded as follows: T2 - 5550 kg/ha. T3-4975 kg/ha. T5-4875 kg/ha and T1 - 4338 kg/ha. Apart from that plots received Inorganic + Biofertilizer N combination had exhibited higher tiller and productive tillers (11.10 /hill and 9.40 / hill) and greater straw yield (7363 kg/ha). Hence it is wise to have an optimum combination of Inorganic and Organic Nitrogen to boost the yield of rice crops. ❑

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