Surge flow irrigation Under short field conditions in Egypt


Abstract:

Several studies carried out in long furrows have shown that surge flow irrigation offers the potential of increasing the efficiency of irrigation. The effects of surge flow in short fields, such as in Egypt, are still not well known, however. To investigate the effect of surge flow irrigation in short fields a series of experiments have been carried out at two different locations in Egypt. The first location with a clay soil was situated at the Agriculture Experimental Station, Assiut University, Assiut. The second location with a sandy soil was situated at the Assiut University Experimental Station for Desert Land, El-Wadi El-Assuity, Assiut. The blocked end furrow lengths and widths were 70 and 0.70m respectively. Three discharges were selected for each soil type, namely 0.46, 0.74 and 0.90 l s⁻¹ for clay soil and 0.73, 1.0 and 1.4 l s⁻¹ for sandy soil. For each discharge two cycle times were investigated, namely 16 and 24 minutes. For each cycle time three cycle ratios were chosen, 1/4, 1/2 and 3/4 for the 16-minute and 1/3, 1/2, and 2/3 for the 24-minute cycle time. The water content was measured at three locations, namely at the beginning, middle and end of the furrow. In each location three points were measured in a vertical line at a depth of 0.01, 0.1 and 0.3 m. The results show that surge flow irrigation leads to a more uniform water distribution along the furrows than continuous flow. This uniformity is more pronounced in clay soil than in sandy soil. Surge flow irrigation decreases the advance time in comparison to continuous flow. The reduction in advance time was more pronounced with the discharges of 0.74 and 1.0 l s⁻¹ in clay and sandy soil respectively. The 24-minute cycle time is better than the 16- minute cycle time. The reduction in advance time with a cycle time of 24 minutes is due to the effect of the offtime. Different cycle ratios can be used but the 1/3 cycle ratio may be the best. In conclusion, surge flow irrigation under the short field conditions as prevailing in Egypt decreases the advance time, increases uniformity and efficiency by decreasing deep percolation and reduces applied water volume by 15–35%. Copyright #2004 John Wiley & Sons, Ltd.

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