

# **EFFECTIVE ON-FARM IRRIGATION MANAGEMENT USING GATED PIPES AS MODIFIED SURFACE IRRIGATION**

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## **ABSTRACT**

A field experiment was conducted during 2009 and 2010 at Sakha Agricultural Research Station (north Nile Delta area) to identify some practices regarding effective on-farm irrigation management particularly under the present status of water shortage facing Egypt.

Gated pipes as improved surface irrigation technique was used in irrigating maize and the studied treatments were; traditional irrigation or every furrow irrigation (EFI-Trt.A), cut-off irrigation (Trt.B), in addition two methods of alternative furrow irrigation of fixed (FAI-Trt.C) and exchange alternate furrow irrigation (EAI-Trt.D). Moreover, two methods for computation of irrigation water based on climatic elements of Ibrahim (Trt.E) and FAO Penman-Monteith (Trt.F).

Main findings showed that water saving compared with traditional irrigation without significant reduction in the marketable grain yield was reached 12% or  $840 \text{ m}^3 \text{ ha}^{-1}$ . Mean values of maize grain yield can be ranked as;  $8.6 > 8.1 = 8.1 > 7.9 = 7.9$  and  $6.7 \text{ ton} \cdot \text{ha}^{-1}$  were obtained under treatments; E, B, D, A, C and F, respectively. Such amount of water saving could be achieved by implementing either cut-off or alternate irrigation technique.

Values of crop water consumptive use (CU) was ranged between 49 and 64 cm for cut-off and traditional irrigation, respectively. Regarding water productivity (WP), Mean lowest and highest values were 1.19 and 1.53  $\text{kg} \cdot \text{m}^{-3}$  water consumed. The lowest values were resulted from treatments A and F, while high values were obtained from other treatments.

Moreover, accurate computations of applied irrigation water without excess or less than the actual crop water needs based on the availability of climatic elements i.e. Ibrahim equation that mainly depending upon pan evaporation and suitable for the studied area or FAO Penman-Monteith equation could be used.

Therefore, in general under the severe water shortage facing Egypt, following are the proposed technical package for improvement surface irrigation:

- Precision land leveling using laser technique which counted as a main procedure for enhancing surface irrigation.
- Gated pipes is also an effective technique in improving surface irrigation due to:
  1. Good uniformity distribution of irrigation water.
  2. Low energy required for operation
  3. Increasing water saving
  4. About 10% from cultivated area could be saved.
- Cut-off or alternate irrigation are promising techniques could be implemented due to high crop yield, high water saving and high water productivity.

**Key words:** gated pipes, cut-off and alternate irrigation, water productivity.