A STUDY ON AN APPROPRIATE DESIGN FOR BUBBLER IRRIGATION SYSTEM

BY

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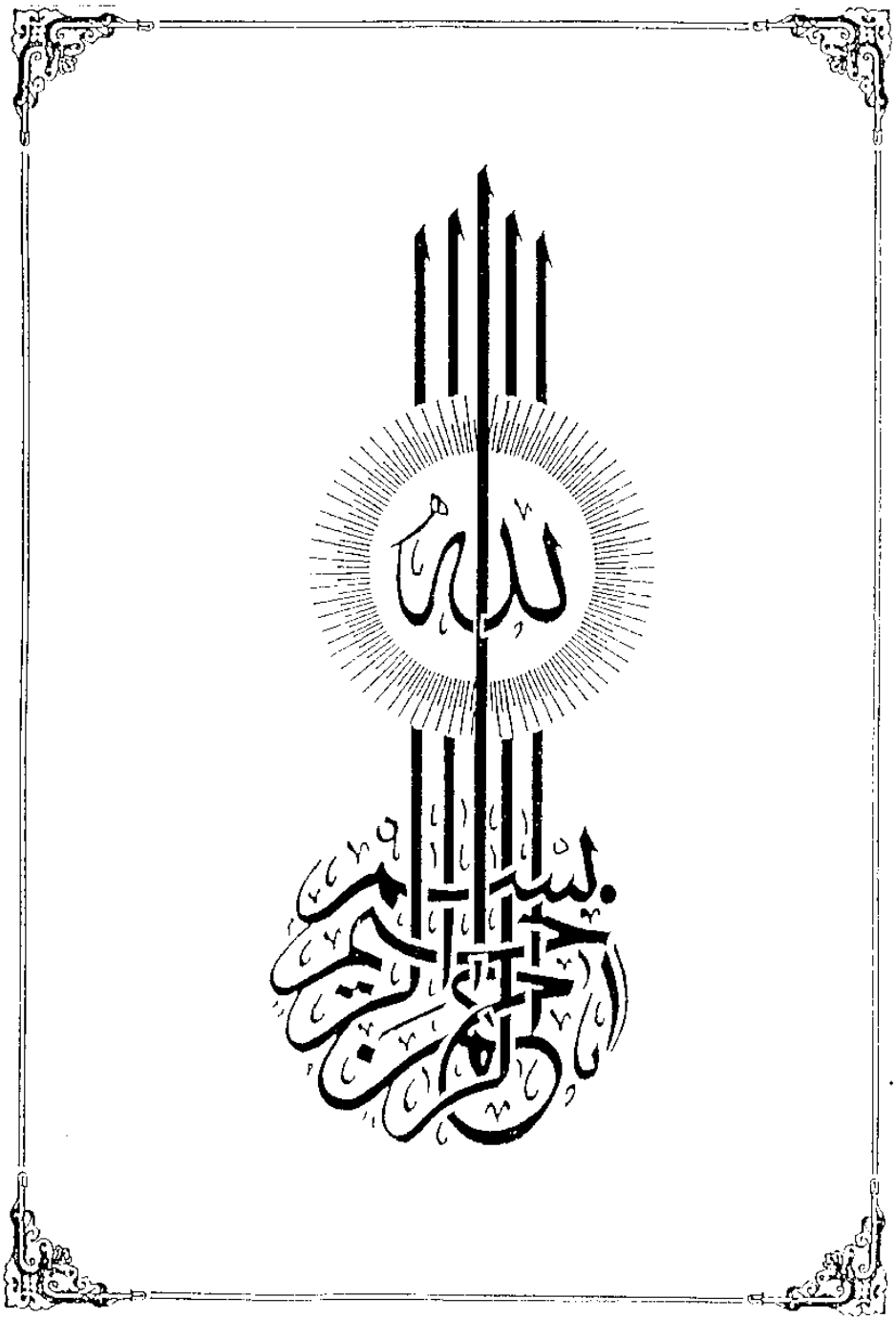

Approval Sheet

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ABSTRACT

Ahmed Maher El-Lithy. A study on an appropriate design for bubbler irrigation system. Unpublished Master of Science, University of Ain Shams, Faculty of Agriculture, Department of Agricultural Mechanization, 1997.

The aims of this study is to get the greatest lateral line length with the best uniformity distribution, through extending it into multi stages with different emitter sizes on each stages.

The main results in this study are summarized in the following:

I- Laboratory experiments.

(1) The effect of pressure head and tube diameter on discharge.

- The discharge of tube increased from "19.59" to " 74.35 L/h" by increasing pressure head from "0.025" to " 1 bar" at tube diameter of "3 mm". The discharge increased from "27.97" to " 54.07 L/h" by increasing tube -diameter from "3" to "4 mm" at pressure head of "0.25 bar".

(2) The effect of pressure and diameter of nozzle on discharge.

- The relationships between nozzle discharge (q) and pressure head (h) at different nozzle-diameters were conducted in the following equation: $q = kh^x$ where k and x are constant.

(3) The effect of pressure and type of screw emitter on discharge.

- The discharge of screw emitter decreased by increasing number of screw thread teeth and screw length into tube at all pressure heads. And the discharge increased by increasing pressure heads.

(4) The effect of valve-emitter angle on discharge.

- It was noticed that there was a wide variation of discharge trying to adjust valves as emitters in field. Thus this part of experiment was cancelled.

II- Field experiments.

- It was found that the lateral length (concerning pressure drop within 10 %) increased by increasing the nozzles spacings. The lateral lengths

were "120", "150" and '168 m" at nozzles spacings of "4", "5" and "6 m" respectively at pressure heads of "1 bar" and "1.4 bar".

(5) Extending the maximum allowable lateral length through multistaging with wider emitters downstream.

- It was notice that the discharge distribution along lateral-line is similar to saw teeth that indicate a good discharge-variation within 5 % along the lateral-line. The lateral length was thus extended by a number of times crossponding to the number of stages.

(6) The effect of nozzles spacing and pressure head on uniformity distribution.

- The uniformity coefficients were "98.24", "98.69", and "98.36 %" at nozzles spacings of "4", "5", and "6 m" respectively and pressure head of "1 bar". These data indicated that there was no remarked effect of nozzles spacings on uniformity- distribution.
- It was found that the uniformity coefficients were "98.24" and "97.68 %" at pressure heads of "1" and "1.4 bar" respectively and nozzle spacing of "4 m". These data indicate that there was no remarked effect of pressure head on uniformity of distribution.

(7) Economical view.

- As a result of using three stage of nozzle orifice-diameters along lateral than with using one nozzle oriface-diameter, save of "120.2 L.E." which is equivalent to "362%" was obtained at the same length and conditions.

KEYWORDS: Bubbler - irrigation system - lateral line - nozzle - valve - uniformity distribution - manufacturing coefficient of variation - pressure head - tube with screw -head loss.

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