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IMPROVING OF TRICKLE IRRIGATION SYSTEMS PERFORMANCE UNDER MICRO-CLIMATE CONDITIONS

By

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B. Sc. Agric. Sc. (Agric. Engineering), Fac. of Agric., Ain Shams Univ., 2011

M. Sc. Agric. Sc. (Agric. Engineering), Fac. of Agric., Ain Shams Univ., 2015

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ABSTRACT

Wafaa Mahmoud Abd El-Bary Ismail. Improving of Trickle Irrigation Systems Performance under Micro-Climate Conditions. Unpublished Doctor of Philosophy. Department of Agricultural Engineering, Faculty of Agriculture. Ain Shams University. 2022.

The research aimed to study the effects of trickle irrigation systems of low-thickness tunnel environments on the growth of tomato plants (*Solanum Lycopersicum L.*). A field experiment was conducted from Dec. 2019 to Oct. 2020, in the Horticultural Department, Faculty of Agriculture at Ain Shams University in Shoubra El Kheima, Kalyubia Governorate, Egypt (latitude 30°, 12'N and longitude 31°, 24'E; mean altitude, 26 m above sea level). The trickle line is 8 m long, the distance between lines is 1 m and irrigation systems were set out using low thickness [50 microns] under mulching, soil composition in experiment area is clay loam. The experiment was laid out in a split-plot design comprising two irrigation systems [surface and sub-surface trickle irrigation] in main plots [built-in emitter, actual flow rates were 8 l/h/m (emitter spacing 0.5m)]. Two tunnel heights [60 and 75 cm] in subplots, as tunnel width was 1 m, tunnel length was 8 m long, three plastic tunnels of low thicknesses [40, 50 and 60 microns] for the winter season. As for the summer season, three shade nets of [30, 50 and 60%] in sub-subplots. The experiment was replicated three times. For the winter season, the value under surface and sub-surface trickle irrigation at treatment plastic thickness 60 microns, the yield was 22.9 and 24.4 ton/fed and water use efficiency was 16.46 and 20.38 kg/m³, respectively. For the summer season, at treatment shade net 60%, the yield was 15.4 and 17.9 tons/fed and water use efficiency was 8.52 kg/m³ and 11.51 kg/m³ under the surface and sub-surface trickle irrigation, respectively.

Key words: Low plastic tunnels, Tomato, water use efficiency, mulching, plant height, plant stem diameter, shade net, and yield.

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