ABSTRACT

EFFECT OF EMITTER DISCHARGE VARIABILITY OF SUBSURFACE DRIP IRRIGATION ON WATER APPLICATION UNIFORMITY UNDER FIELD CONDITIONS

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Emitter flow rate in subsurface drip irrigation decreases due to the high pressure of soil water at the discharge point of emitter. In this study, the variation in emitter discharge in subsurface drip irrigation laterals is examined. First, coefficient of variation of the emitter (CV_q) was measured in field conditions without plant material with different drippers. For this purpose, four different dripper models are used: 2 L/h non- compensating, 4 L/h non-compensating, 1,6 L/h compensating and 2,3 L/h compensating models. Additionally, the soil pressure coefficient of variation CV_{hs} was measured in buried emitters. By the help of the measured values in the soil, water retention curve parameters were determined with HYDRUS 2D program. Then, the irrigation uniformity was simulated with a MATLAB program in surface and subsurface drip irrigation laterals under the same operating conditions and mediumtextured heterogeneus soils. CVq values of the compensating emitter models were similar for both the surface and subsurface conditions. However, CVq values were decreased for the 2-L/h non-compensating model. This shows a possible self-regulation of non-compensating emitter discharge in SDI, due to the interaction between effects of emitter discharge and soil pressure. This resulted in a greater values of the irrigation uniformity of SDI non-compensating emitters than surface drip irrigation. The uniformity with pressure-compensating emitters would be similar in both cases, provided the overpressures in SDI are less than or equal to the compensation range lower limit.

Key words: subsurface drip irrigation systems, performance analysis, water application uniformity