



Rational use of water in trickle irrigation design.

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In trickle irrigation systems, the design is based on the pre-established emission uniformity (EU) which is the combined result of the equipment characteristics and its hydraulic configuration. However, this desired value of the EU may not be confirmed by the final project (in field conditions) and neither by the yield uniformity. However, the most important is to assure yield uniformity with rational use of water. The hypotheses of this research were: a) the EU of a trickle irrigation system at field conditions is equal to the emission uniformity pre-established in the design; b) EU has always the lowest value when compared with other indicators of uniformity; c) the discharge variation coefficient is not equal to production variation coefficient in the operational unit; d) the productivity variation coefficient is more dependent on water depth applied than the EU. This study aimed to evaluate the relationships among EU used in the irrigation system design, water depth applied and the final yield uniformity.

The uniformity indicators evaluated were: EU, distribution uniformity (UD) and the index proposed by Barragan & Wu (2005). They were compared estimating the performance of a trickle irrigation system applied in a citrus orchard with dimensions of 400m x 600m. The design of the irrigation system was optimized by a Linear Programming model. The tree rows were leveled in the larger direction and the spacing adopted in the orchard was 7m x 4m. The manifold line was always operating on a slope condition. The sensitivity analysis involved different slopes, 0, 3, 6, 9 and 12%, and different values of emission uniformity, 60, 70, 75, 80, 85, 90 and 94%. The citrus yield uniformity was evaluated by the variation coefficient.

The emission uniformity (EU) after design differed from the EU pre-established, more sharply in the initial values lower than 90%. Comparing the uniformity indexes, the EU always generated lower values when compared with the UD and with the index proposed by Barragan. The emitter variation coefficient was always lower than the productivity variation coefficient. The water depth applied had more influence on citrus yield than the EU. It is necessary to consider the irrigation system uniformity and mainly the water depth to be applied to get rational water use and also to obtain uniformity of production.