

Closure to “Contribution of Evapotranspiration Reduction during Sprinkler Irrigation to Application Efficiency” by A. Martínez-Cob, E. Playán, N. Zapata, J. Caverro, E.T. Medina and M. Puig.

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As stated in the paper, the aim of the work was to quantify gross and net SEL and the reduction in transpiration and evapotranspiration during both daytime and nighttime solid-set sprinkler irrigation of corn. The main goal was to study how much of SEL contributed to meet crop water requirements and whether this possible contribution occurred during daytime and nighttime irrigation events.

Dr. Yildirim raised some questions that will be answered in the following lines:

a. Among different efficiency and uniformity patterns which criterion/criteria should be first taken into consideration to decide the best performance of a sprinkler irrigation system?

Different efficiency indicators have been reported in the literature. In the case of sprinkler irrigation, efficiency includes both the effects of SEL and uniformity. A common efficiency indicator used in sprinkler irrigation is the Potential Application Efficiency of the Low Quarter (PAE_{lq}), as defined by Merriam and Keller (1978) and revised by Burt et al. (1997):

$$PAE_{lq} = \frac{\bar{I}_{tg}}{\bar{I}_{lq}} 100 \quad [1]$$

where: \bar{I}_{tg} , average depth of irrigation water contributing to target; \bar{I}_{lq} , low quarter average infiltrated depth.

SEL_n do not contribute to the irrigation target. As a consequence, SEL_n result in decreased PAE_{lq} . The focus of the paper is only related to this question and not to the effect of irrigation uniformity on efficiency. Our findings indicate

that a fraction of SEL contribute to meet crop water requirements. As a consequence, PAE_{Iq} is higher than if all SEL were considered as losses.

b. How is the estimated value of EF_{apl} as 0.85 determined?

The value of $EF_{apl} = 0.85$ was a priori estimation, only used for weekly irrigation scheduling. This estimation took into account previous WDEL measurements performed in the experimental irrigation system (Dechmi et al., 2004; Playán et al., 2005). In order to avoid any possible water stress during the season, an average value of EF_{apl} was included in Eq. (3) of the original paper when computing crop irrigation requirements.

c. What is the level of water application uniformity (distribution uniformity) when the estimated value of application efficiency (0.85) along the sprinkler irrigation system?

The results of the uniformity experiments were not reported because this was not the goal of this paper. However, the coefficient of uniformity (Christiansen, 1942) was computed for each irrigation event, ranging from 60 to 86 % for daytime irrigations and from 70 to 86 % for nighttime irrigations, depending mostly on wind speed during the irrigation.

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