Adv Crop Sci Tech 2018, Volume 6
DOI: 10.4172/2329-8863-C1-006

Effect of intra-irrigation meteorological variability on center-pivot water distribution and crop yield

Sofiane Ouazaa[1], **J Burguete**[2] and **N Zapata**[2]
[1]Corpoica, Colombia
[2]EEAD-CSIC, Spain

Water application depth from a center-pivot irrigation system is not uniformly distributed across a field due to emitter package design, tower dynamic and meteorological variability. The objective of this study was to incorporate in a center pivot irrigation model, the simulation of rotating spray plate sprinklers (RSPS) and the simulation of intra-irrigation meteorological variability. The final goal was to simulate the spatial and temporal variability of irrigation depth and yield of a center pivot. The irrigation season of the commercial center-pivot cropped with corn was analyzed. An automatic meteorological station was installed to monitor meteorological data with a 1 s frequency. Ten irrigation events were evaluated using radial catch-cans. The mechanical movement of the center-pivot towers for each irrigation event was characterized using GPS monitoring. The corn was harvested with a harvester equipped with GPS monitoring. The calibrated and validated ballistic model of the RSPS for different nozzle sizes, pressures and wind conditions was mounted on the pivot lateral, following the correspondent sprinkler package. The center-pivot lateral was moved following the measured and the simulated towers dynamic of all the irrigation events. Results indicated that no significant differences in total uniformity coefficient between experimental dynamic, simulated dynamic and complete aligned tower dynamic for the whole irrigation season. This could be explained by the perfect tower mechanical movement incorporating a very small switching on/off angle. However, the results showed significant effects in water distribution pattern between simulations considering average and time varying wind conditions. Center-pivot model including current tower dynamics and variable on time wind conditions improves the simulation results compared with a model simulating aligned tower movement and homogeneous wind conditions. The variability of the measured yield agreed with applied irrigation depth and the simulated corn yield. However, there are some unrelated areas between simulated irrigation depth and measured corn yield which could be due to other factors, not considered in this study, such as the soil characteristic, application of fertilizers, pest attack, etc.

souazaa@corpoica.org.co