



Abstract Template

Selection of irrigation duration for high performance furrow irrigation on cracking clay soils

Rod Smith, Jasim Uddin and Malcolm Gillies

National Centre for Engineering in Agriculture, University of Southern Queensland, Toowoomba, Qld

The maximum efficiency attainable by furrow irrigation in any particular situation is determined largely by the soil infiltration characteristic and the flow rate onto the field. However the correct selection of irrigation duration (or time to cut-off) is necessary to realise optimum performance. As a result of previous work the cotton industry in Australia has increased furrow flow rates and reduced irrigation durations with the effect of raising average application efficiencies from a low 48% to now above 70%. This is the maximum that can be achieved under current management practices. Raising efficiency further can only come about by managing each irrigation (by varying flow rate and T_{co}) to give optimum performance for the prevailing conditions. The previous work has shown that applications in excess of 85% are possible by this means. A consequence is that greater accuracy and precision is required in the selection and management of irrigation durations.

In this paper, various methods for estimating the optimal or preferred time to cut-off in real-time (while the irrigation is underway) are compared, namely, cut-off when the advance reaches a set distance, guidelines based on the advance rate, and real-time optimisation using hydrodynamic simulation. Simulations using historic data from two cotton fields show that there is little difference in the efficiencies achieved by the three methods. However, there is substantial difference in the data required by the different methods and in their robustness to inaccuracies in the data. These latter points will dominate selection of the most appropriate method for any particular situation.