

Irrigation methods for efficient water application: 40 years of South African research excellence

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Abstract

The purpose of an irrigation system is to apply the desired amount of water, at the correct application rate and uniformly to the whole field, at the right time, with the least amount of non-beneficial water consumption (losses), and as economically as possible. We know that irrigated agriculture plays a major role in the livelihoods of nations all over the world and South Africa is no exception. With the agricultural water-use sector being the largest of all water-use sectors in South Africa, there have been increased expectations that the sector should increase efficiency and reduce consumption in order to increase the amount of water available for other uses.

Studies and research over 40 years, on the techniques of flood-, mobile- and micro-irrigation have contributed to the knowledge base of applying irrigation methods correctly. In a recent study on irrigation efficiency, the approach is that irrigation efficiency should be assessed by applying a water balance to a specific situation rather than by calculating various performance indicators. The fraction of the water abstracted from the source that is utilised by the plant is called the beneficial water-use component, and optimised irrigation water supply is therefore aimed at maximising this component. It implies that water must be delivered from the source to the field both efficiently and effectively. Optimising water use at farm level requires careful consideration of the implications of decisions made during both development (planning and design), and management (operation and maintenance), taking into account technical, economic and environmental issues. An exciting, newly-developed South African Framework for Improved Efficiency of Irrigation Water Use covers 4 levels of water-management infrastructure: the water source, bulk conveyance system, the irrigation scheme and the irrigation farm. The water-balance approach can be applied at any level, within defined boundaries, or across all levels to assess performance within the entire water management area.

Keywords: irrigation methods, water-use efficiency; water-balance approach, beneficial water use, South African framework