

Irrigated agriculture

Guidelines to improve efficient use of surface and subsurface drip irrigation systems

A set of guidelines available from the WRC is helping farmers and irrigation designers get more out of drip irrigation technology.

Background

The application of drip irrigation (the frequent application of small amounts of water as directly as possible to the roots of crops), might be as old as irrigation itself. However, while plastic pipes and nozzles have long since replaced ancient clay containers, drip irrigation is still considered the most efficient form of irrigation. This makes it particularly applicable to South Africa with its semi-arid climate and amid increasing competition for water from various users. South African irrigators especially, are under increased pressure to use the available water resources more effectively, while increasing productivity amid rising input costs.

Recent figures (2007) indicate that around 22% of land under irrigation in South Africa is already making use of drip irrigation. The technical development of irrigation equipment over the last couple of years has been immense. Like any irrigation technology, drip irrigation is only efficient when it is correctly selected, planned, designed, managed and properly maintained.

The WRC has funded numerous studies into drip irrigation technology over the last decade, including research projects on surface and sub-surface drip irrigation and filtration. While the research confirmed the technology as one of the most efficient methods of applying irrigation water, the studies also highlighted the critical importance of maintenance and the requirements it places on management practices.

New guidelines

The WRC's consequent knowledge dissemination drive has resulted in the compilation of two new manuals on *Technical Aspects and Cost Estimating Procedures of Surface and Subsurface Drip Irrigations Systems*, one for irrigation designers and the other for irrigation farmers. The purpose of the manuals is to guide irrigation designers and farmers through useful information to make the most productive use of drip irrigation. A balance, therefore, has to be found between cost-effective and water efficient irrigation for food production, given the competing demands on water currently used for irrigation.



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Tests and recommendations

The manuals provide comprehensive information on drip irrigation from technical aspects of surface and subsurface drip irrigation systems; filtration equipment and cost estimating procedures. In addition, the manuals include recommendations and guidelines regarding the suitability and management of soil and water for drip irrigation, as well as the selection, costing, design, principles, operation and maintenance of drip irrigation and filtration equipment. The manuals are specifically aimed at drip irrigation in field and permanent crop applications, and therefore do not apply to greenhouses or specialised fertigation units.

Various laboratory and field studies have informed the manuals. For example, the WRC funded investigations into the performance of South African drip irrigation technologies by the Agricultural Research Council Institute for Agricultural Engineering (ARC-IAE).

Popular driplines were selected and tested as new and used (old) pipes. Information on clogging problems experienced by farmers was collected. Sampling of driplines from various regions of South Africa was based on perceived and reported problems. Dripper type and age were also used as criteria for sampling. The used drip systems were evaluated in the field before laboratory testing. This procedure was repeated over two years.

It was found that clogging of emitters is one of the major problems associated with drip irrigation, usually as a result of poor maintenance or poor water quality. Among others, it is therefore recommended that regular water quality analysis be carried out to identify potential clogging problems. Other preventative measures, such as the use of root growth inhibitors against root intrusion, are also discussed. The information generated by the ARC-IAE study can also assist in emitter type and filter selection. Proper maintenance schedules and their implementation are underlined as being of utmost importance for the long-term efficient operation of drip irrigation systems.

Knowledge-base system

Along with the manuals, a CD-based knowledge base system has also been compiled which captures information on the various types of drippers and filtration equipment, together with their technical performance characteristics and design information. This information can be sorted and searched in a number of ways, and all the information in the database (including pictures) can be printed.

Information days

The WRC, along with its research partners, have already held several information days and training workshops throughout South Africa to disseminate the information captured in the drip irrigation manuals. There has been great interest both from parties already using drip irrigation and those considering using drip irrigation. Participants have included irrigation designers, commercial, large- and small-scale farmers, and managers. Continuous professional development courses were organised to train designers on the technical and economic principles of the selection and usage of surface and subsurface drip irrigation systems. Field days were used to practically demonstrate the principles of economics, operation and maintenance of drip and filtration systems to farmers and irrigation managers.

It is hoped that the manuals will find further use for practical short courses or as part of demonstrations. In this way support can be provided to those farmers that have already installed drip irrigation or to farmers who are considering changing from flood or sprinkler irrigation to drip irrigation.

Further reading: To order the guidelines, *Technical Aspects and Cost Estimating Procedures of Surface and Subsurface Drip Irrigations Systems Volume 1: Main Report (Report No. TT 524/12)*, *Volume 2: manual for irrigation designers (Report No. TT 525/12)* and/or *Volume 3: Manual for irrigation farmers (Report No. TT 526/12)* contact Publications at Tel: (012) 330-0340; Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.