PROMOTING

WATER USE EFFICIENCY

IN IRRIGATED SUGARCANE PRODUCTION

Some SASRI initiatives

THE SOUTH AFRICAN SUGARCANE RESEARCH INSTITUTE (SASRI) HAS BEEN CONDUCTING RESEARCH INTO WATER RESOURCE USE, EFFICIENCY AND MANAGEMENT FOR A NUMBER OF YEARS. THIS ARTICLE DESCRIBES THREE OF THE MANY PROJECTS CONDUCTED BY SASRI THAT RELATE TO WATER USE IN SUGARCANE AGRICULTURE.

MyCanesim

The *MyCanesim* system was developed by SASRI to support irrigation management. It is an on-line weather based modelling system that estimates crop water use and growth and provides real time scheduling advice to subscribers via SMS, fax or e-mail. It also provides a production efficiency report that includes crop stress indicators, actual irrigation rainfall and evapotranspiration totals and the associated cane yield and cane quality potential.

It has been implemented successfully on a small-scale grower scheme in Pongola in a Water Research Commission (WRC) funded project and has been operational since 2004. The project was awarded the International Commission on Irrigation and Drainage (ICID) WATSAVE award in 2007.

In a new project, started in 2011, the system will be adapted for the needs of the Mpumalanga sugar industry. Electronic soil water measurements will be integrated into the system and restricted water allocation will be taken into account to improve the accuracy of the advice. Sugarcane growers and extension staff from SASRI, Tsb Sugar and MDALA will be involved in its development and implementation and will be trained to use *MyCanesim* to support agronomic decision making of commercial and small-scale farmers, especially with respect to irrigation scheduling. The system will be evaluated from 2011 to 2013 on selected small-scale projects and commercial farms. If the *MyCanesim* service proves practical, reliable and useful for improving water use efficiency and profitability, it could be made available to more growers.

SEBAL

The Surface Energy Balance Algorithm for Land (SEBAL) is a model which uses energy balance theory to derive land surface characteristics such as canopy temperature and leaf area index from satellite (e.g. Landsat, Modis and Meteosat) and weather data.
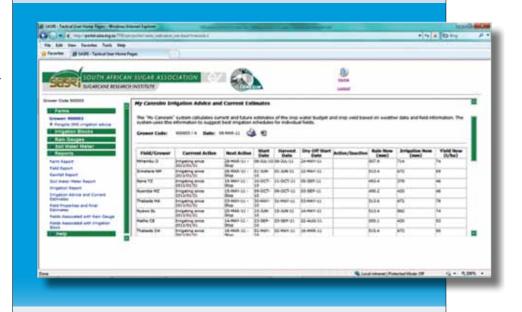
A WRC funded project involving the collaboration of SASRI, University of KwaZulu-Natal, University of Free State, University of Pretoria, WaterWatch (Netherlands), and the University of Delft aims to determine the accuracy and usefulness of SEBAL estimates of crop water use, biomass yield and water use efficiency. From these, weekly, monthly and seasonal totals of evapotranspiration, crop growth and water use efficiency can be calculated and mapped for individual fields, which can be

accessed via the Internet. A project with table grapes in the Western Cape has successfully demonstrated the usefulness of SEBAL for supporting irrigation and crop management (www.grapelook.co.za).

In the sugarcane component of the project, SEBAL and Canesim estimates of evapotranspiration and crop growth will be compared to measurements on the ground. Workshops with potential users such as farmers, extension specialists, irrigation advisors and representatives of water user associations will be held to explore how SEBAL data can be used to assess and improve water use efficiency at field, farm and catchment level.

Accurate irrigation scheduling based on weather and soil water data is essential for efficient use of water and can enhance profitability of sugarcane production.

An example of a MyCanesim report that provides field level irrigation scheduling advice.

Malelane in November 2010, stakeholders were invited to contribute to the re-designing of the irrigation module. The following were highlights of the stakeholder workshop. The new irrigation module will consist of three sections: water use authorisation, wetlands and water courses, and irrigation and drainage. The irrigation and drainage section, where most improvements will be made, will include guidelines for:

- determining the suitability of irrigation system (planning and design),
- operation and maintenance, and
- monitoring and evaluation.

These improved standards, guidelines and best management practices in the new SuSFarMS irrigation module are anticipated to pave the pathway to improved irrigation performance and beneficial use of a scarce water resource. ✍

Sustainable Sugarcane Farm Management System (SuSFarMS)

SuSFarMS is a farming system designed to encourage sustainable sugarcane production. It consists of a manual and an audit sheet. The manual lays out the legislation, better management practices and guidelines for sustainable farming. An integral part of the system is a voluntary self audit tool. It serves as a management and extension tool to assist users/growers to assess the current performance levels and develop plans for ongoing improvement.

In a current project, SASRI is revamping the irrigation module of the SuSFarMS tool. Following the completion of the WRC project titled "Standards and guidelines for improved efficiency of irrigation water use from dam wall release to root zone application", a comprehensive set of updated standards and guidelines are available for use in SuSFarMS.

The new irrigation model is envisaged to **guide irrigators to operate within the water law, benchmark irrigation performance, improve current practices and continually increase the efficiency with which water is used**. In a workshop in

Abraham Singels
Principal Agronomist
South African Sugarcane
Research Institute
South African Sugar Association

Ashiel Jumman
Agricultural Engineer
South African Sugarcane
Research Institute
South African Sugar Association