Water Saving Simulation Model

Article by John Fair

Irrigation water is not only becoming more expensive, but it is also – more importantly – becoming an increasingly precious commodity. No wonder the government has introduced new water laws, albeit unpopular with those who are the prime producers of our country's wealth – our farmers.

On the positive side of the balance sheet, however, the Water Research Commission (WRC) are offering irrigation farmers a wonderful and very valuable water saving simulation model at a give-away-price. For a mere R500 you can install a sophisticated computer model which has the potential to bring about substantial savings in the amount of water required to produce any given crop. Although the model is sophisticated it is, nevertheless, user friendly. It has been named SWB (Soil Water Balance) and was developed by the University of Pretoria with WRC funding.

Free State farmer Paul Farrell at his automatic weather station

What is the optimum amount of water required to produce a crop? This is a question that most irrigation farmers grapple with on a daily basis. Too little water means crop losses. Too much water is not only more costly but it also pulls down yields. Efficient use of water is a tricky balancing act. It is like walking on a tightrope – it is so easy to fall off on either side of the wire. The SWB model is much more than a safety net; it is like a broad gangway; one on which farmers can confidently walk, knowing that they will produce top crops with the minimum amount of water.

Paul Farrell in maize

COMPUTER THE IDEAL TOOL

A computer is the ideal tool for handling all the variables, and interactions involved in the decision-making process to determine the correct amount of water to apply. It is well neigh impossible for the human brain to put it all together in a flash. The word flash is appropriate because effective irrigation requires daily, and in some cases hourly, decisions. Consider just some of the factors involved.

- The crop needs. Not just the type of crop but also it's stage of growth.
- Evaporation and transpiration rate, which are affected by numerous factors such as solar radiation, temperature, relative humidity and wind speed.
- The ability of the soil to absorb and hold water.
- The amount of effective rain.

Intelligent use of water can prevent this sort of disaster in citrus

The computer puts all this together but, of course, it requires the right information. To provide this, sophisticated equipment is required. The most expensive is an automatic weather station (AWS) that transmits most of the relevant information to the computer. This radio weather station is moveable and can be placed in a position that is best suited to the crop being irrigated – this is an important aspect in getting the best results from SWB model.

To reduce costs it is possible to link SWB to regional weather stations. This can be done by phoning in for data or logging on to the Internet. It is also possible for several farmers to purchase a single AWS. The downside of such cost saving moves is, however, loss of accuracy because the weather factors involved can differ quite substantially over relatively short distances.

Apart from the weather station, soil water measurements are desirable. For this purpose relatively inexpensive tensiometers that must be read, to expensive neutron probes that can be directly linked to the computer can be used.

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Paul Farrell Jnr, of Paul Farrell Farming in Bethlehem, uses SWB to help him manage his irrigation schedule. He is very pleased with the model, but points out that it does not eliminate the need for measurements. Paul says that SWB works for all types of irrigation systems, but it is just good sense to make use of the more efficient ones, such as the dripper lines. This is why Farrell Farming has installed surface dripper lines on 180 ha.

The use of SWB is enabling Paul Farrell Farming to optimise the use of their limited water resources and crop yields are excellent. Many other irrigation farmers could also benefit markedly by installing the system. After all, why look a virtual gift horse in the mouth?

Farmers interested in SWB can contact:

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