Case Study

IRRIGATION SCHEDULING TOOLS SHOW HOW TO IMPROVE SYSTEM PERFORMANCE

The Rural Water Use Efficiency Irrigation Futures (RWUE-IF) project has been delivered in Lakeland with the support of the Queensland Department of Natural Resources and Mines. This project is focused on assisting Queensland growers to better manage water resources within the new Government planning guidelines. Growcom is delivering the program to horticulture producers, providing a valuable service to growers through on farm technical advice, irrigation system evaluations, farm water use reports and training in irrigation scheduling and fertigation.

Some of the ways the project has addressed the limited water resource in Lakeland is through demonstration of the value of irrigation scheduling tools, how to utilise existing equipment efficiently and the value of understanding system requirements when investing in new equipment.

KMSI is the Knowledge Management System for Irrigation, developed by the National Centre for Engineering in Agriculture with funds provided by the Queensland Government as part of the South East Queensland Irrigation Futures project.

In addition to pump and irrigation system evaluations, water budgeting tools have been used to demonstrate potential savings in water and energy usage. The Water Manager Tool (WMT) is a strategic decision support tool used to assess current irrigation management practices and the interactions between the crop and the irrigation system. The WMT also develops a personalised irrigation schedule and water budget for the grower based on the characteristics of the enterprise.

Data collected on one banana farm in Lakeland showed an application rate of 1.15 mm/hr, scheduled to deliver 4.62 mm/day throughout the growing season.

The daily water requirement for a banana ratoon crop was calculated using the crop coefficient and evapotranspiration rates from weather station data recorded in Cooktown.

In Lakeland, the estimated daily irrigation requirement for an established banana crop ranges from 5.2 mm/day from May to June and 8.4 mm/day in October. The managed system capacity of the irrigation system is 4.62 mm/day from April to December. To cover all irrigation shifts this program runs 24 hours a day so it is not possible to increase the application depth of the current managed system capacity. The combined crop water requirement averages for each month are seen in Graph 1. While this amount of water may not necessarily need to be applied, this is what the system would be required to deliver in the absence of rainfall. The red line shows the managed system capacity is below the average crop water requirement throughout the year, including months where low or no rainfall is typical. The greatest variation between the two occurs in October, where in the absence of rainfall the current managed capacity would deliver just over half the crop water requirement (mm/day).

Graph 1: System Capacity vs Combined Crop Water Requirement

In order to estimate the portion of the crop water requirement that would typically be supplied through irrigation the average rainfall must be considered. Long term average rainfall data has been used to calculate the crop water requirements with rainfall, as indicated by the green line on Graph 2.

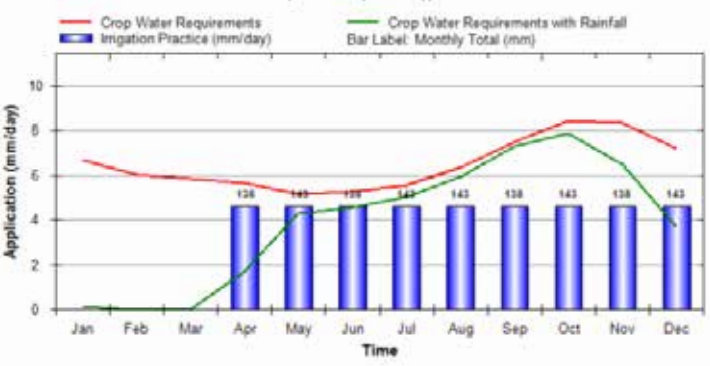
The Irrigation practice marked on this graph relates to data collected for 2014 as well as a projection of irrigation throughout the year. The crop water requirement with rainfall is based on long term rainfall data so may not necessarily reflect the rainfall for 2014.

According to these figures, there would typically be rainfall in April for the crop of just over 2 mm/day. Assuming April 2014 experienced typical rainfall, over-irrigation may have occurred. In addition to exceeding crop water requirements, over-irrigating

also attracts higher energy costs and depletes the water supply and soil condition.

If July to September receives the average rainfall, under the current managed system capacity the crop water requirement would not be met with rainfall for five months. To avoid making such assumptions, rainfall data recorded on farm should be used to calculate a more accurate crop water requirement using site specific rainfall data.

Graph 2: Crop Water Requirement vs Grower Irrigation Practice



Based on the water applied per irrigation, the current irrigation practice does not reach or exceed the soil full point and it is estimated that no deep drainage or run off is occurring. The WMT has generated a daily irrigation run time that outlines the time that irrigation shifts would need to run in order to meet the afore mentioned estimated daily irrigation requirements.

At the current managed system capacity that runs 24 hours/day, in the absence of rainfall the suggested run times could not be met in order to meet daily crop requirement.

The WMT also compares total available water with current accumulated water usage and the accumulated irrigation needed to meet crop water requirement. Each of the graphs generated helps the grower to better understand their current water usage in relation to crop requirement, system capacity and available water resource.

Some irrigation scheduling tools and soil moisture monitoring data is currently in use on the farm which does help remove some of the many assumptions and estimated values that are made in these evaluations. Incorporating localised rainfall data would further assist in calculating the irrigation necessary to meet crop water requirements under specific farm conditions. By taking into account the crop water requirement, rainfall data and soil moisture holding capacity; a more efficient irrigation management system may be designed to meet crop requirement within the managed system capacity and available water resource.

For more information, contact the Growcom Land and Water Field Officer on 07 3620 3844.

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