



CARING
FOR
OUR
COUNTRY

RRRD004

Advanced drip and optimised furrow irrigation to minimise sediment, nutrient and pesticide losses to the environment through deep drainage and runoff from sugarcane and banana industries of wet tropics in northern Queensland

David J Midmore, Surya P Bhattarai
CQUniversity



Australian Government
Department of the Environment, Water, Heritage and the Arts
Department of Agriculture, Fisheries and Forestry





CARING
FOR
OUR
COUNTRY

Summary of Issue

- Sugarcane industry largely irrigated by furrow
- Off farm transport of sediments & pollutants related to the rainfall events and irrigation run-off and leaching
- Drip irrigation has capacity to control irrigation and staggering and directing the application of fertilizer
- Potential benefits of drip in achieving gains in water use efficiency, environmental outcomes and yield not tested systematically
- In the wake of decreasing water allocation and climate change with unpredictable weather pattern, usefulness of drip for attaining the environmental and productivity outcome are becoming more important.





CARING
FOR
OUR
COUNTRY

Project objectives

- Measurement of the losses of pesticides and nutrients from cane and banana fields, and their distribution in runoff and deep drainage
- Determine why differences in water quality arise from different management protocols (furrow vs. drip comparison, optimizations)
- Quantify long term impacts on soil stability and structure through effects on soil physical, chemical and biological properties that reduce runoff
- Modelling to quantify scaled up projected beneficial waterwise irrigation innovations and soil management practices, to farm and catchments levels
- Determine the key factors for adoption of Best Management Practices), including the design of a *decision support system*, an analysis of *socio-economic drivers and resistance for adoption*, and a test of fit under a *triple bottom line* matrix for different methods that substantially reduce sediments and runoff loads.





Approach: Team, Methods

- Approach - on farm trials, multidisciplinary approach
- Team

Name	Organisation	Role	FTE
Prof David J Midmore	CQUniversity	Leader, exe, agronomy	0.10
Peter Durand	Netafim Australia	Drip optimization	0.02
Dr Ninghu Su	JCU	Hydrology for N Qld	0.10
Dr Chris Carroll	DERM	Liaising and policy	0.02
Mr Stephen Attard	CSIRO	APSIM modelling	0.05
Dr Surya Bhattarai	CQUniversity	Res mgt/coordination	0.50
Dr Raj Sharma	CQUniversity	Hydrology Bundaberg	0.10
Dr Jill Windle	CQUniversity	Growers interaction	0.05
Dr Ted Gardner	CQUniversity	Hydrology and water	0.02

- Method:

Field trial comparing furrow vs drip sugarcane in delta soil (alluvial) at Home hill

Monitoring and modeling of sugarcane run-off and leaching of pesticides in furrow irrigated Barrata soil (clayey) at Claire

Monitoring and modeling of sugarcane run-off and leaching of pesticides in overhead irrigated ferrosol Bundaberg

Monitoring and modeling of banana run-off and leaching of pesticides in micro sprinkler irrigated soil in South Johnston





CARING
FOR
OUR
COUNTRY

Geographic scope

- Burdekin (Delta and Barrata soil) – for irrigated sugarcane farming system
- South Johnstone – for irrigated banana farming system
- Bundaberg – for irrigated sugarcane farming system
- Pot trials under rain simulator for the decay and movement of pesticides over time.





CARING
FOR
OUR
COUNTRY

Outputs

- Stakeholder consultations, program orientation for locating sites.
- Meeting and workshop of research providers, businesses, industries and natural resource management groups
- Sites verification, plot layout, equipment installed and functioning.
- Data on soil, plant, water and sediment transport and runoff collected
- Field day events for each industry to demonstrate outputs and effects of treatments.
- Modelled outputs on the effects of optimised drip on run off and transport
- Best management guides on soil, plant and water management to reduce sediment transport and off farm movement of runoff published & distributed for dissemination.



Australian Government

Department of the Environment, Water, Heritage and the Arts

Department of Agriculture, Fisheries and Forestry





CARING
FOR
OUR
COUNTRY

Synergies – Reef Rescue & external

- Collaboration between CQU University, Netafim, JCU, CSIRO, DERM, DEEDI, BBIFMAC, NQ Dry Tropics, Canegrowers Australia
- Sharing of others research sites, optimizing use of instrumentation and investing in quality data collection (value adding)
- Enhancing the participation of growers, industry & locally based organizations and expertise (e.g. Tom McShane)
- Linking CQU current research on drip irrigation with number of industries (NPSI, HAL, Woolworths funding).
- Association with postgraduate research activities.
- Invest time to develop large scale commercial site for future long term R&D



Australian Government

Department of the Environment, Water, Heritage and the Arts

Department of Agriculture, Fisheries and Forestry





CARING
FOR
OUR
COUNTRY

Management Implications

- Proposed sharing of monitoring sites, rather than creating new sites due to short term funding
- For longer term paired comparison of different irrigation methods for off farm movement of nutrients & pesticides. Consultation with Netafim progressing
- Drip irrigation is still new to sugarcane industry and the potential benefit of this system is not still harnessed. Optimization of drip to offer full benefits to industry needs to be demonstrated.
- On site placement of CQU researchers for increasing collaboration, cooperation and speeding up farm scale research activities.





CARING
FOR
OUR
COUNTRY

End user engagement & delivery

- Consultation with growers
- Association with local NRM group e.g. BBIFMAC
- Active involvement of the irrigation suppliers in research process
- Engaging the water board and linking with Canegrowers Australia
- Plan of field days
- Presentation to the growers meeting



Australian Government

Department of the Environment, Water, Heritage and the Arts

Department of Agriculture, Fisheries and Forestry

