Above: Joe Tama

KEY POINTS

Aim - Examine the water quality gains and economic implications of shifting to drip irrigation.

Factors

- Electricity costs
- Irrigation labour requirements - differences between drip and furrow
- Irrigation repair and maintenance
- Crop nutrient expenses - fertigation compared to traditional mechanical application
- Cane yield and CCS
- Herbicide use
- Irrigation volumes and quality

The results will compare inputs into drip and furrow irrigation systems and document water savings and crop yields. This allows the primary producer to investigate production, capital costs, return on investment and energy cost when considering the opportunity to switch irrigation systems.

JOE TAMA

LOW COST ALTERNATIVE IRRIGATION TRIAL

Property location: Iyah, 8km south of Home Hill

THE PROJECT

What's happening at this site?

Joe is hosting the Project Catalyst Low Cost Alternative Irrigation Trial which is trialling a cost-effective drip irrigation system.

FOCUS ON

- Immediate improvement in water quality runoff will be expected in comparison to furrow irrigation
- Significant reduction in water applied and available runoff, and a reduction in nutrient and herbicide rates applied through the closed system
- The low cost drip system is expected to perform comparably to a more expensive drip irrigation systems within water quality gains and only need minor increases in management
- Provide an overall economic gain in reduction of installation costs

Above: Installation of prototype automation system for furrow irrigation at Willy Luas' Project Catalyst trial site

Above: Installing PolyNet ™ system subsurface at Joe Tama's Project Catalyst trial site.

BACKGROUND

A second generation farmer, Joe emigrated from Sicily as a child with his family in 1961. Joe's father started working cutting sugarcane and his mother grew small crops on 6ac of leased land.

The family venture has since expanded to include sugarcane, horticulture and a variety of off farm investments giving Joe a sound background in farming and business.

Maintaining diversity within his income streams, Joe bought his own 228ha sugarcane farm in 2006 and has since purchased the Ayr Gypsum and Lime Company.

Joe has recently harvested the first of his agroforestry crops, which is a long-term investment in marginal soils which were unsuitable for regular crop cycles.

CHALLENGE

Poor irrigation efficiency is limiting the ability to manage nutrient and pesticide runoff leaving the farm.

Salinity in underground irrigation water, affecting soil health and causing marginal yields, has led to investigation of alternative irrigation methods for more precision within nutrient application, irrigation and reduce total water usage.

While drip irrigation has proven to be a viable option with favourable yield results, the costs of installing the standard drip systems is prohibitive. This has led to the trial of low cost alternative systems.

TREATMENTS

T1	Drip Irrigation
T2	Furrow Irrigation

MONITORING

The water quality benefit of the low cost drip irrigation will be assessed particularly on total irrigation water usage, and chemical and nutrient application rates. As runoff within this system is negligible, all irrigation water inputs will be metered and nutrient application amounts logged.

Monitoring will also take into account the cost-benefit of implementing this alternative irrigation system.

ECONOMIC ANALYSIS

The economic analysis developed by delivery partner the Queensland Department of Agriculture and Fisheries will examine the economic implications of Joe shifting to drip irrigation. This requires a thorough investigation of crop growing expenses such as energy, irrigation labour and repairs, and nutrition expenses.

Under furrow irrigation, the trial block yielded poorly in ratoons, prompting Joe to plough-out after the first ratoon. Improvements in ratoon performance may prove to be the key for Joe to recover his initial investment.

QUOTES FROM THE GROWER

" We need to be proactive, but still address the economics of keeping agriculture viable," said Joe.

" Events like this are great to get together with fellow growers and look at what's being done outside the region."

OUTCOMES TO DATE

Drip irrigation can be quite expensive to install with conventional systems costing up to $7,000 per hectare. However, there are some low cost alternatives available. For example, Joe has substituted more expensive options like gravel filters and PVC supply sub-mains with low cost options including a screen filter, and sunny hose sub-mains. With these options, Joe has been able to limit his expenditure to $3,200 per hectare. Table 1 shows a breakdown of Joe's investment into drip irrigation on a 10-hectare block.

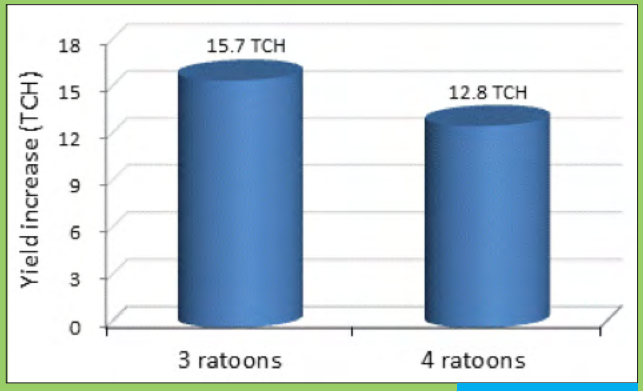
Item	Expenditure ($)	($/ha)
Drip tape	$27,000	$2,698
Sunny hose	$2,000	$200
Screen filter	$580	$58
Pump adapter, fittings and pipe connections	$1,000	$100
Installation	$1,440	$144
Total	$32,020	$3,200

In order to provide a comparison between conventional furrow irrigation and Joe's drip irrigation site, information from an adjacent furrow irrigated block was used in the analysis. The furrow block has similar characteristics to the drip blocks including water quality (saline) and soil type. The differences in production costs between the irrigation systems during the fallow, plant and ratoon crop classes are outlined in Table 2. Overall, the drip system saves from having no laser levelling expenses and lower Gypsum application costs in the fallow. However, during both the plant and first ratoon crops, the drip system accrues relatively higher irrigation electricity costs and crop nutrition expenses that outweigh savings in irrigation labour, cultivation and weed control expenses.

	FALLOW			PLANT CROP			RATOON CROPS		
	Furrow	Drip	dif.	Furrow	Drip	dif.	Furrow	Drip	dif.
Laser levelling	$194	$0	**-$194**	-	-	**-**	-	-	**-**
Gypsum	$800	$400	**-$400**	-	-	**-**	-	-	**-**
Cultivation	$501	$501	**$0**	$130	$29	**-$101**	$81	$0	**-$81**
Weed control	$29	$29	**$0**	$59	$33	**-$26**	$39	$31	**-$8**
Planting	-	-	**-**	$846	$826	**-$20**			
Crop nutrition	-	-	**-**	$690	$898	**$208**	$429	$636	**$207**
Irrigation:									
• Electricity	-	-	**-**	$380	$743	**$363**	$313	$686	**$373**
• Labour	-	-	**-**	$234	$60	**-$174**	$192	$54	**-$138**
• Repairs/ maintenance	-	-	**-**	$60	$45	**-$15**	$50	$41	**-$9**
TOTAL	**$1,524**	**$930**	**-$594**	**$2,399**	**$2,634**	**$235**	**$1,104**	**$1,448**	**$344**

To afford them the same profitability as the furrow block and breakeven, the drip blocks need a comparatively higher yield to generate enough revenue to cover both the higher production costs and repay the capital expenditure into drip irrigation. Figure 1 examines the yield change required for the drip-irrigated blocks to realise the same profitability as the furrow block, assuming a constant CCS level. Two scenarios are evaluated that examine different crop cycle lengths; a three and a four ratoon crop cycle.

In the case of the drip irrigation scenario with a three ratoon crop cycle, an extra 15.7 TCH more than the furrow irrigated block during each crop class is necessary to breakeven. Comparatively, if the crop is extended to four ratoons, a relative yield increase of only 12.8 TCH is needed to breakeven.



Above: Figure 1