Using Rice$cenario to improve the business of rice growing

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Abstract. The implementation of the Murray-Darling Basin Plan and competition for irrigation water between crops has resulted in fluctuations in water availability and price. There is now a range of water products available to growers who are largely unskilled in trading water. Rice Extension identified the need for a simple, user-friendly decision support tool to assist growers in determining their most economical water price and quantity for a planned irrigation scenario. No other free tool was available. Rice$cenario was released in 2015. Growers obtain enterprise gross margins and sensitivity analyses on yield, price and purchased water. A number of training workshops have been held. There are 219 unique users of Rice$cenario and these users have created more than two scenarios each. Users reported increased understanding of water costs and greater confidence in decision making around growing a crop with allocated water, additional purchased water or selling their water to maximise their business' profit.

Keywords: Decision support, RiceScenario, rice, irrigation, gross margins.

First an example

A rice grower, let's call him Wayne Waters, grew two rice crops using two different sowing methods in the 2015-16 rice season. One crop was dry broadcast and the other was drill sown. The two crops were analysed using the decision support tool, Rice$cenario (Table 1). The drill sown crop had lower input costs and used 1.2 ML/ha less water than the dry broadcast crop. Both crops yielded 12.8 t/ha. At a rice price of $415/t, the drill sown crop made a gross margin of nearly $300/ha more. By using a combination of sowing methods, Wayne made a total gross margin of $213,621.

Table 1. An example of differences between a drill sown and dry broadcast crop

Crop	Yield (t/ha)	Water use (ML/ha)	Rice price ($/t)	Gross income ($/ha)	Variable costs ($/ha)	Gross margin ($/ha)	Area (ha)	Total gross margin
Drill sown	12.8	10.7	$415	$5,312	$1,336	$3,976	23	$91,448
Dry broadcast	12.8	11.9	$415	$5,312	$1,610	$3,702	33	$122,166

The enterprise was then analysed to determine the most profitable option. If Wayne had used his allocated water to drill sow his entire crop, he would have been able to grow 3.7 ha more crop and reduce his other input costs. The total gross margin for drill sowing his entire crop would be $237,367. By dry broadcasting 33 ha, Wayne missed out on nearly $24,000 additional net income.

This is the kind of scenario comparison that the decision support tool, Rice$cenario, helps growers assess.

Background

In recent years, rice growers have had to become more entrepreneurial. Water allocations have been variable, increasing the variability in water price (McLeod 2016). There has been an increase in the number and complexity of water trading products (Murray Darling Basin Authority 2016) and competition for water from other crops such as cotton (Aither 2016). In addition, irrigation corporations have changed the way they charge for water since the separation of land and water titles. These changes in the water market have resulted in the need for an improved understanding of water costs and crop costs.

Each season, irrigators make decisions around what crops to grow, the area of each crop, how much water is required and how much the water costs. Understanding how to calculate the price of water, crop gross margins and sensitivity analysis to determine risk are essential steps for making the best decision to improve the business. Water costs are the major driver of profitability in irrigated farming systems and to undertake a useful gross margin analysis it is necessary to calculate with accuracy the variable cost of water. Every rice farming business is different. They vary in size, enterprise mix, location, structure, resource availability, equity and capital. Therefore, it is important that each grower understands their own numbers.

Improvements in financial management skills are required for rice farmers because of the complexity of financial decisions (Glyde et al. 2014). Rice Extension identified the need for a

simple, user-friendly decision support tool to include calculations of irrigation costs and budgets over the irrigation season. There was no 'free of charge' tool in the marketplace that could meet this need. Decision support tools have the ability to help farmers make improved choices, but must be location specific, user-friendly and relevant (Nguyen, Wegener & Russell 2016).

The decision support tool would allow growers to improve their understanding of their irrigation needs and costs and the gross margin of all crops and livestock enterprises within the farming business, particularly when planning for the coming season. Growers would be able to assess different scenarios including water purchasing, crop size, variety, sowing methods and crop management to maximise their profitability with their existing water availability.

The aim of the tool was to let growers determine:

- A water budget — how much water is required for an irrigation program or how much crop can be grown with the water available.
- Fixed and variable costs of allocated and purchased water.
- An average price for irrigation water (purchased, allocated and other).
- What price a grower can afford to purchase water.
- Gross margin of farm enterprises, such as rice, winter crops, other summer crops and livestock.
- Sensitivity analyses on yield, crop price and purchased water price.
- Income and input costs to use in farm budgets.

Development of Rice$cenario

Development for the decision support tool - Rice$cenario - started in 2013. Water costs were collated from irrigation companies to create a water budgeting calculator. Real grower crop gross margins were collected by the agronomists at Murray Local Land Services, and incorporated into the tool to create templates for a gross margin calculator.

Rice$cenario was then developed into a web-based tool so that growers are guided through a step-by-step process that prompts them to input details specific to their farm. Rice$cenario has default costs for inputs included in the templates. However growers are encouraged to input their own information. The outputs of the tool are water costs, gross margins of enterprises and sensitivity analyses on yield, price and purchased water of the given scenario.

The tool has been reviewed and improved since its 2015 release. Focus groups of rice growers have been consulted during major upgrades to the tool. The role of these reviews was to evaluate the practicality of the tool for grower use, ensuring its relevance and ease of use.

Communication strategy

Promotion of Rice$cenario has been communicated by various means. Articles have been included in six Rice Extension newsletters explaining how to use the tool to plan for the next crop, calculate the cost of water and compare different enterprise scenarios including livestock. Rice$cenario has been on the agenda at four business management workshops, four grower forums providing information about irrigation and at six pre-season grower forums. The promotion of Rice$cenario has been targeted both directly at rice growers and at advisors to rice growers including rural financial councillors and bankers. Communication activities were undertaken when growers are typically planning for their next crop to maximise the adoption of the tool.

Monitoring, evaluation and results

Use of Rice$cenario has been recorded through website analyses. Users must enter their email address to use Rice$cenario. Since its release, 218 unique email addresses have been entered and 489 scenarios created as at May 2017. This is 30% of the total Australian rice growers using the tool, preparing at least 2 scenarios each along with their consultants. The median progress through the step-by-step process is 94% showing that the tool is intuitive and easy to complete.

Over the past year, its use has varied across the season, with increases around promotion events, particularly during typical planning times, as shown in Figure 1. Table 2 shows timing of promotion activities undertaken for Rice$cenario over the same 12 month period. Promoting the use of Rice$cenario through workshops and at grower forums has had a larger influence on user uptake than newsletter articles. Newsletter articles are useful to improve awareness of the tool to a large audience. However, forums and workshops allowed trial and evaluation of the tool, which are more likely to improve adoption than awareness alone (Eberle & Shroyer 2000).

At some grower forums and workshops, participants were asked to provide feedback on the topics presented, including Rice$cenario (Table 3). It rated well at all events. When participants

were asked the value of the Rice$cenario, average responses ranged from 7.6 to 8.8 out of 10 at all events. Where participants were asked what the most valuable things learnt were as a result of the workshop or forum, 26-43% of attendees listed Rice$cenario. At another forum, the highest-ranking topic requested was Rice$cenario.
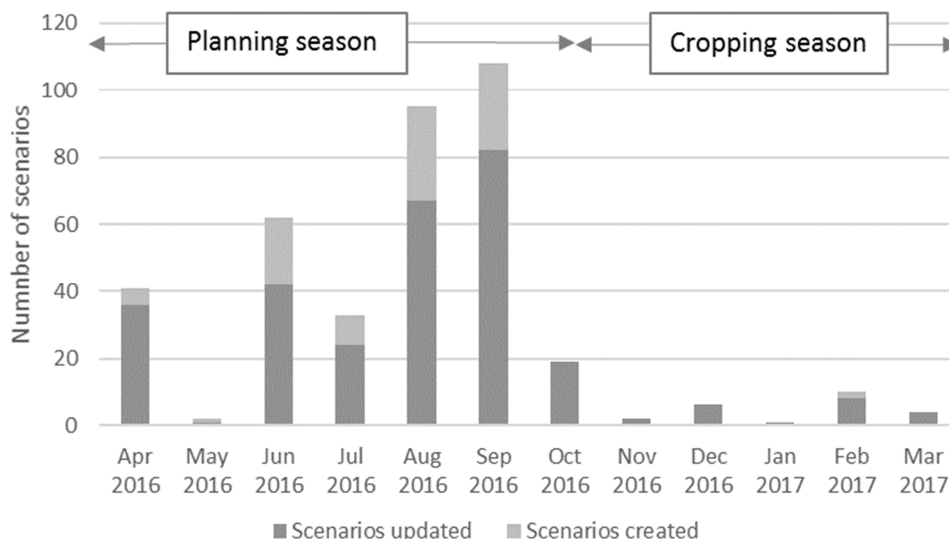
Figure 1. Use of Rice$cenario over a 12 month period

Table 2. Rice$cenario extension activities (number) over a 12 month period from April 2016 to March 2017

	A	M	J	J	A	S	O	N	D	J	F	M	Audience (Number)
Newsletter article	1			1	1						1		1474
Workshop			3										54
Grower forum topic					6								281

Table 3. Feedback received regarding usefulness of Rice$cenario

Event	Feedback question	Result
2015 'Innovator's workshop'	On a scale of 1-10, rate the value of Rice$cenario	8.8/10 (n = 6)
2015 Murrumbidgee 'Water trading forums'	On a scale of 1-10, rate the value of Rice$cenario	8.1/10 (n = 38)
2015 Murrumbidgee 'Water trading forums'	List the three most valuable things learnt as a result of this workshop	26% of attendees who responded listed Rice$cenario
2016 Murray 'Water trading forum'	On a scale of 1-10, rate the value of Rice$cenario	7.6/10 (n = 24)
2016 Murray 'Water trading forum'	List the three most valuable things learnt as a result of this workshop	43% of respondents listed Rice$cenario
Requested topics for 'Pre-season Meetings'	Rank your preferred topic for the upcoming meetings from 1-10.	Rice$cenario ranked the highest topic request

Future work and opportunities

The Rice$cenario decision support tool uptake by rice growers and their advisors is high, at 30% of rice growers. Using the tool allows them to better understand the costs within their business, compare gross margins and the risk profile of different enterprises. Positive feedback received and the large number of users of the tool demonstrates that growers see the advantages of using the planning tool and find the tool user-friendly and useful.

However, producing gross margin budgets has limitations (GRDC 2013) and further analysis of business profitability is necessary. Therefore, Rice Extension is planning an upgrade that will allow the input of overhead costs, which, when combined with the gross margins of each enterprise, will create a farm cash flow for each scenario. Growers will be 'bank ready' with a more comprehensive analysis of their business as they can provide their financiers with a cash flow budget supported by detailed financial reports. This will provide transparency and confidence to the financial institution for improved business outcomes.

Regular promotion of Rice$cenario will encourage growers to continue using the planning features. Articles in newsletters on planning and gross margin analyses will be used to promote new research and innovation. Reminders will be sent to encourage growers to use Rice$cenario in planning the next crop cycle. However, to ensure increased uptake of the tool by growers and their advisors, further forums and workshops with hands-on opportunities for training and experience will be run.

An increased understanding of water costs and greater confidence in decision making around growing a crop will maximise profit and ensure the sustainability of each rice farming business.

Acknowledgements

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