



# Delaying the application of permanent water to rice – will it improve returns?

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## IN A NUTSHELL

- Drought and reduced water availability have led to a top rice crop on reduced inputs and delayed permanent watering, resulting in good returns and excellent water productivity
- This experience raises the question 'can rice production be more profitable with delayed application of permanent water?'
- A delayed watering system will be further investigated in 2008–09 and farmer co-operators are being sought

*Delaying the application of permanent water to rice is a technique that has been successfully used by a few rice growers throughout the region to improve the water productivity of their rice crop.*

The industry benchmark for water productivity of rice in the MIA is 0.75 tonnes per megalitre (t/ML) for the medium grain variety Amaro and 0.70 t/ML for long grain variety Langi. Improving yield or reducing water use, or a combination of both, leads to increases in water productivity – which growers are increasingly managing to do.

## What happened in 2008?

The majority of rice grown in the 2007–08 season was irrigated using bore water and given the smaller crop size planted by each grower, the crops were managed well. Establishment conditions were ideal for rice crop growth and development in 2007, and temperatures remained above average for most of January. Evaporation was also above average, which resulted in elevated water use. However, crops benefited from rain associated with thunderstorms before Christmas (59 mm for Griffith for December) and mid January (52 mm in Griffith for January). This was followed by well-below average temperatures in February, which may have had an impact on reducing yields of some crops during flowering.

## Setting the benchmark for water productivity of rice

Willbriggie irrigator Dick Thompson was able to combine all the water from three farms to grow rice in 2007–08, after making an earlier decision not to water his wheat. He was also fortunate to be located on a continuous supply channel for horticulture, and thus was able to access water for rice in 2007–08. Although Dick planted two varieties in 2007, it was his Quest crop that

really shone, grown with just 8.5 ML/ha of rainfall and irrigation water. This translated to a water productivity figure close to 1.2 t/ML, far exceeding expectations.

The rice crop was drill sown into moisture (on a red clay loam soil) following a wheat crop, on 6 November 2007, with a seeding rate of 140 kg/ha and nitrogen at 65 kg/ha. The crop survived on minimal rain. Weeds were controlled by cultivation prior to sowing.

The crop did not receive permanent water until mid December. At that time the crop was severely moisture stressed, although recovered quickly after the application of permanent water. The crop was topdressed with another 65 kg/ha of nitrogen just prior to panicle initiation (PI). Deep water (26 cm) at the critical early microspore stage proved to be a key in obtaining a 10 t/ha crop (with microspore occurring around the 5 February when low minimum temperatures occurred). The crop was locked up on 18 March and harvested from 22 April.

With such minimal inputs, the gross margin per megalitre and per hectare made Dick's crop very profitable. With the price for his two varieties averaging \$500/t, Dick believed these were the highest returns per megalitre possible from his water. He still also had the added value of sowing a winter crop into the full moisture profile left over from the rice, furthering his GM/ML and GM/ha.

## A new rice growing system?

The management strategy of Dick's crop was to deliberately delay permanent water for as long as possible in order to save water. Although the crop was stressed it was able to recover and compensate once permanent water was applied near PI.

In the past there have been a number of crops or bays which have run out of water in the time running up to PI, either due to supply problems or broken banks. One such crop in the Eastern



Murray Valley (EMV) had no surface water from before PI to late January when an allocation increase allowed permanent water to be reapplied. This crop, although very ordinary, went on to be one of the highest yielding crops in the district helped by above average conditions throughout the critical microspore stage.

Research trials with intermittent watering (Thompson and Griffin 2006) measured evaporation intervals, and once they reached a certain point, permanent water was applied to the crop to avoid moisture stress. In this regime, water savings were about 10–20% and grain yields were about the same or a little lower compared with crops in a normal flooding regime.

We wonder whether there is potential for a new water management system for rice?

The thinking behind a delayed permanent water system is quite the opposite of our conventional thinking on rice growing. The flushings are only applied to augment rainfall and moisture remaining from a previous crop. Permanent water would be applied at PI in order to protect the crop from cold damage at the critical microspore stage and provide adequate moisture for the grain production phase. Because of the moisture stress, crop growth and yield are likely to be 10–20% lower than a conventionally managed crop. However with lower inputs and potential water savings of 20–30% the gross margin per megalitre water applied under the assumptions above is higher than a conventionally flooded crop. This system if successful would also enable the growing of larger areas of rice with the same amount of water thus increasing farm income and profit.


### Fine-tuning to come

In 2008–09 it is planned to carry out two demonstrations in the MIA with delayed permanent water. With these demonstrations

water use, rainfall, inputs and yield will be accurately measured.

Any farmers who may be growing rice in 2008–09 and are interested in trialling this system should contact the authors.

Delaying the application of permanent water to rice may not suit everyone's rice growing system. Stressing the rice before PI whilst saving water is likely to lead to reductions in yield. However the thinking is that gross margin per megalitre is increased which is the main goal of rice farmers.

Although it is a potential technique that can save water and help improve water productivity, further research and extension will be needed to fine tune issues such as suitable layouts, weed control, nitrogen timing, actual water savings and to verify the importance of rainfall. 

### Further information

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### Reference

*J Thompson and D Griffen (2006). Delayed flooding of rice – effect on yields and water. Farmers' Newsletter, No.173, Spring 2006.*



**Figure 1.** NSW DPI technical officer Kathryn Bechaz and contract harvester Garry Harriman inspect the 10 t/ha Quest rice crop at Dick Thompson's property, near Griffith. Photo: John Lacy



**Figure 2.** This successful Quest rice crop in 2007–08 raises the question 'Can rice be grown profitably if permanent water is delayed?'. Photo: John Lacy