# Using raised beds on rice farms

## - a summary of the Coleambally Demonstration Farm Experiment

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### in a nutshell

- Rice grown on raised beds produced equivalent yields to the traditional flat layout
- The over-riding conclusion from this experiment is that adoption of terraced zero-graded bankless channel rice layouts (including raised beds) is likely, as the layout system increases cropping choice and flexibility, and significantly reduces labour requirements
- Adoption will be dependent on locations with:
  - existing land grades that allow creation of zero-graded layouts with appropriate terrace widths and steps to allow adequate drainage (landforming costs not being excessive)
  - access to large irrigation flows or on-farm storages in order to achieve short duration 'water on/water off' times for crops other than rice

***To remain financially viable and environmentally sustainable, rice growers in southern New South Wales need to be able to readily respond to market opportunities, increase crop productivity, increase water productivity and manage water tables. Improved irrigation layouts may allow an increased range of cropping opportunities and productivity increases, whilst reducing environmental impacts.***

The objective of this research was to assess the performance of rice, wheat, soybeans and barley on lateral permanent raised beds ('beds in bays') compared with conventional flat irrigation layouts.

A large replicated field experiment was conducted at the Coleambally Demonstration Farm. The project investigated the performance of several crop sequences with rice in the rotation. The experiment included double cropping with side-by-side demonstration of permanent raised beds (using furrow or subsurface drip irrigation) and traditional 'flat' layouts.

## Performance of raised beds v flat

### Rice

Rice crop performance, grain yields and crop growth on raised beds were as successful as that achieved by rice on conventional flat systems.

As with other crops, it is important for rice crops that the furrow gap (area with no established plants) be as narrow as possible. Our results indicate that grain yield is likely to be reduced if the gap is wider than 50 cm. To achieve the desired arrangement the sowing equipment needs to able to sow into the shoulders of the bed.

*Figure 1. Establishment of rice on beds 2002.*

### Wheat & barley

Raised beds did not provide a yield advantage in any season for wheat (2003, 2004 and 2005) or barley (2003) over the flat layout. This result reflects the absence of winter rainfall conditions conducive to the development of waterlogged conditions. During the experiment from sowing to flowering of the wheat and barley, there were only four rainfall events which exceeded 20 mm, an amount considered necessary for waterlogging effects on crop growth. There were three falls of rain during July and August 2003 (all about 25 mm) that resulted in visual differences in crop growth. However, they were spaced 22 and 21 days apart and did not result in differences in dry matter production at flowering or in grain yield. There were no significant rainfall events in 2004 and only one (35 mm on 11 June) in 2005.

## Performance of subsurface drip v furrow

### Rice

Whilst it is most unlikely that subsurface drip would be installed to grow rice, the current experiment provided the opportunity to investigate potential yields. In 2003–04, water was not ponded over the beds during the growing season except for about 14 days to assist with the uptake of topdressed nitrogen. Grain yield was reduced by approximately 20% compared with treatments that were ponded for most of

*Figure 2. Rice on beds prior to harvest 2002–03.*

*Figure 3. Establishment of second consecutive rice crop on beds.*

*Figure 4. Growth of fourth rice crop on beds during early December 2005.*

*Figure 5. Fourth rice crop during mid January 2006.*

the growing season. In 2005¬–06, water was ponded over the beds that were irrigated with subsurface drip during early pollen microspore (to minimise any effect of low temperatures). For the rest of the growing season, water was supplied by the drip system and there was no water in the furrows. Grain yield was reduced by approximately 15% compared with treatments that were ponded all season. These results confirm other research which concluded that the exceptionally high growth rates of rice between panicle initiation and flowering necessitate an abundance of water which can only be satisfied under flooded conditions.

### Wheat, barley & soybeans

In general, grain production from crops irrigated with subsurface drip was similar to those crops that were furrow irrigated. In 2004–05, soybeans under drip irrigation produced an 8% higher grain yield (this difference may have been as a result of lower plant numbers established on the furrow layout). In 2006, wheat under drip irrigation produced a 10% lower grain yield. The other three comparisons (soybeans in 2003–04 and barley in 2003 and 2004) all produced similar grain yields from both irrigation systems.

## Water use

Although there were some statistically significant differences, there was no practical difference in water use between the layouts studied in this experiment. Similarly there was little difference in water productivity between layouts or irrigation method.

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### Further reading

***Final report of experiment***

*HG Beecher, JA Thompson, BW Dunn, RP Singh and SK Mathews (2007). Using raised beds on rice farms - innovative rice based cropping systems. RIRDC Publication number 07/115 (available from RIRDC website www.rirdc.gov.au).*

***Progressive reports of experiments***

*Geoff Beecher, Brian Dunn, John Thompson, Shayne Mathews, Daniel Johnston & Kieran O'Keeffe (2008). Permanent beds on rice farms – the final year. IREC Farmers' Newsletter, Rice R&D edition, No. 177, Summer 2007–08, pp 20–22.*

*Geoff Beecher, Brian Dunn, Shayne Mathews, John Thompson, Rajinder Pal Singh , Liz Humphreys, Jagadish Timsina, Keiran O'Keeffe & Daniel Johnston (2007). Permanent lateral beds for sustainable cropping systems on rice farms. IREC Farmers' Newsletter, Rice R&D edition, No. 174, Summer 2006–07, pp 4–8.*

*Geoff Beecher, Brian Dunn, Shayne Mathews, John Thompson, Rajinder Pal Singh , Liz Humphreys, Jagadish Timsina, Keiran O'Keeffe & Daniel Johnston. Permanent lateral beds for sustainable cropping systems on rice farms (2006). IREC Farmers' Newsletter, Rice R&D edition, No. 171, Summer 2006, pp 24–27.*

*Shayne Mathews, Geoff Beecher, Brian Dunn, John Thompson, Liz Humphreys & Daniel Johnston (2005). Permanent beds for sustainable cropping systems. IREC Farmers' Newsletter, Rice R&D edition, No. 168, Summer 2005, pp 25–27.*

### Further information

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