NUFFIELD AUSTRALIA FARMING SCHOLARS

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MEDIA PROFILE

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Growing rice with less water

It's been 37 years since Leigh Vial's property was without a rice crop. The drought, and reduced irrigation allocations in the Riverina, made putting in a crop a pointless exercise.

It is perhaps fitting, then, that Mr Vial spent a good part of last year investigating the potential for aerobic rice – which doesn't need flood irrigation – in Australia. He traveled to China, the Philippines and the US after receiving a Nuffield Farming Scholarship supported by Rabobank in late 2005 to carry out the research.

Mark Bennett, Rabobank State Manager for Victoria, presented Mr Vial with his Nuffield scholarship in 2005. He says the scholarship offers a once-in-a-lifetime experience to an increasing number of talented farmers. "For outstanding Australian farmers like Leigh, this scholarship provides the support needed to pursue innovative research initiatives on a global scale – this is an amazing opportunity and one that Leigh has obviously fully embraced," he says.

The place that left the most lasting impression on Mr Vial was China Agricultural University in Beijing. It is here that scientists are taking a radical approach to keeping the country's 1.3 billion people supplied with rice.

"They're in the process of reversing the way they grow rice in Northern China by taking rice out of flood water," says Mr Vial. "China, especially Northern China, has monstrous water shortage problems and, because they have predominantly sandy soils that don't hold water particularly well, growing rice in the flooded state is an intense use of water.

"Instead of ponding the water on, they irrigate the rice two, or sometimes three, times. There's been a compromise in yield, but the amount of rice grown per unit of water has doubled."

Mr Vial, who farms at Moulamein in southern NSW, says a major way in which the Chinese situation differs from Australia's is that the Chinese grow rice on leaky soils and by only irrigating two or three times they save a lot of water from seepage.

Australian producers have already addressed the issue of seepage, with rice-growing only permitted on soils that have been tested for minimal leakage. "But we are looking to save on evaporation," Mr Vial says

Water losses through evaporation remain a problem in the early weeks of the Australian rice season – until the crop has fully covered the bay.

Mr Vial believes the Chinese system of an alternating wet and dry (AWD) cropping regimen would bring significant water savings. "If we grow rice in non-flooded soils at strategic times of year we could save evaporative elements to the degree of 20-30 per cent," he says.

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The outlook

The ability to grow rice with less water is becoming more pressing as cuts to water allocations leave growers such as Mr Vial without a crop.

The federal government's rural economic forecaster, the Australian Bureau of Agricultural and Resource Economics (ABARE), in its February crop report predicted 2006-07 summer crop production would fall 59 per cent to 1.9 million tonnes – the smallest haul since 1982-83.

Rice production was forecast to drop 90 per cent to just 106,000 tonnes. This reflects the lack of irrigation water for rice which has seen plantings cut to 12,000 hectares – down 89 per cent on last year.

Senior grains analyst with Rabobank, Ingrid Richardson, says the outlook for rice production in the foreseeable future will continue to be dependent on water and water allocations.

"We will have to wait until the run-off and inflows into the system start in August before we have a really good idea of the outlook for rice," she says.

Breeding new varieties

The AWD approach being investigated by Mr Vial is similar to how rice was first grown in Australia. The rice is sown like wheat, using no-till technology, and then irrigated intermittently – to keep the moisture sufficient for germination and growth – but not kept in a ponded condition.

This contrasts with the bulk of Australian rice crops, which are aerial-sown in water and flooded until two to three weeks before harvest.

Before the AWD regimen can be adopted, a more drought-tolerant breed of rice needs to be developed, Mr Vial says.

"Our varieties are currently bred to be highly productive sitting in ponded water. Drought-tolerant varieties would need to have slightly different characteristics in the nature of their root systems and how their leaves behave. If you take the varieties we have at the moment out of water and put them in moist soils they start to get stressed."

Mr Vial says the aerobic rice germplasm that will be needed to start developing these drought-tolerant varieties has now arrived in Australia from the International Rice Research Institute in the Philippines. Rice breeders at the NSW Department of Primary Industries have started the process of introducing the drought-tolerance trait to rice while not compromising grain quality.

While the new drought-tolerant varieties are being developed – a process expected to take 10 years – research needs to continue on nitrogen retention and weed control, Mr Vial says.

Weed control

As part of his Nuffield scholarship he traveled to Arkansas, Texas and California in the US to discover how primary producers there are addressing weed and nutrient management.

In the US and elsewhere, advances in weed control technology have played an essential role in the development of the rice industry. Herbicides have proven critical to obtaining optimum yield and maximum profit.

Before the development of selective rice herbicides, weed control involved intensive manual labor.

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Maintaining an adequate flood has also been important to managing weeds in rice.

Mr Vial found many rice producers were using Clearfield rice to combat weeds. Clearfield rice is not genetically engineered, having been developed through mutation rather than gene transfer. It is tolerant of a family of herbicides known as the imidazolinones, group B mode-of-action herbicides.

“We don’t have that mode of action available to us in rice currently as there has not yet been a strong enough need for that mode here in Australia,” says Mr Vial.

“However we have pretty much lost the efficacy of one significant chemical so herbicide efficiency is pushing people in that direction.”

Mr Vial anticipates any change to how rice is grown in Australia will bring new weed control challenges.

“Taking rice out of floodwater removes the bulk of broadleaf weed pressure – they simply do not emerge – but also increases the grass weed pressure, particularly barnyard grasses such as *Echinochloa*,” he says. “The herbicide resistance we have at present is of broadleaf weeds to a broadleaf weed herbicide. AWD rice will get us away from current resistance problems but could create new herbicide resistance problems if grass weed control is not handled wisely.”

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FARMING OPERATION

- 3100 hectares;
- Managed by Leigh with his wife Sue Pretty, sister Robin Crawford and brother-in-law Alistair;
- 150-200 hectares of rice grown a year, but none this year;
- 600 hectares of winter crops;
- 2000 Merino ewes.

2007 NUFFIELD FARMING SCHOLARSHIP – APPLY NOW

Primary producers from across Australia have the opportunity to extend their knowledge overseas as 2007 recipients of Australia’s most prestigious agricultural award – the Nuffield Farming Scholarship, offered by Nuffield Australia.

Winners will be selected based on agricultural and leadership capabilities, and their potential to make a strong contribution to the future of Australian agriculture or fisheries. Each Australian scholarship is valued at $25,000 and is supported by leading Australian commodity, agribusiness and philanthropic organisations.

Scholarship applications close on June 30, 2007. Application forms are available from the Nuffield Australia office on 02 6964 6600, enquiries@nuffield.com.au or on the website: www.nuffield.com.au.

ABOUT RABOBANK

A supporter of the Nuffield scholarships for nine years, Rabobank Australia is part of the international Rabobank Group, the world’s leading specialist in food and agribusiness banking. Rabobank Australia is one of Australia’s leading rural lenders and a significant provider of business and corporate banking and financial services to the Australian food and agribusiness sector. The bank has 46 branches throughout Australia.

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