

Trip report – ‘Water-Wise Rice Production’

A workshop hosted by the International Rice Research Institute (IRRI, Los Banos, Philippines) and jointly organised with Plant Research International of Wageningen University and Research Centre (WUR-PRI, Wageningen, Netherlands) 8-11 April, 2002

John Thompson

Co-operative Research Centre for Sustainable Rice Production
C/- Yanco Agricultural Institute
PMB Yanco 2703
<http://www.ricecrc.org>

¹NSW Agriculture
PO Box 736, Deniliquin, 2710

Introduction

The workshop was jointly organised by IRRI (B Bouman and TP Tuong) and Plant Research International of Wageningen University and Research Centre (P Bindraban and H Hengsdijk). The workshop dealt with the problems caused by water shortage in rice production in Asia, and was represented by delegates from Water Workgroup of the Irrigated Rice Research Consortium, Water-Less Rice Project, Growing More Rice With Less Water, Groundcover Rice Production Systems and the Rice-Wheat Consortium.

My attendance was encouraged and funded by the CRC as the workshop theme was particularly relevant to my project within Program 1 – 1204: ‘Strategies for improving the water use (efficiency) of rice. I was invited to present a paper titled ‘Water management of rice in southern New South Wales, Australia’.

The proceedings will be published as a book during 2003.

Objectives of the workshop

The objectives of the workshop were to:

- present and discuss state-of-the-art practices in the development, dissemination, and adoption of water-saving technologies in rice production at scale levels ranging from the field to the farm, irrigation system, and sub-basin;
- identify research gaps and opportunities (in management technologies at the field level, implications for varietal development, adaptation and adoption, and upscaling issues); and
- plan and refine workshops of the various projects and consortia and identify opportunities for developing new proposals.

Thirty papers were presented with ‘sessions’ on resource-use efficiency, aerobic rice, water savings in rice-wheat systems, water use and water savings in the Philippines, the System for Rice Intensification (SRI) and varietal improvement. An afternoon field tour of some relevant experiments at IRRI was included.

Participants from Australia, China, India, Indonesia, Germany, Madagascar, Philippines, Sri Lanka, The Netherlands, Thailand, and the United States attended.

Highlights

Water savings

A number of experiments in China and the Philippines compared a continuously submerged (ponded) treatment with intermittent irrigation. In some experiments a treatment incorporating a drying period of 1-2 weeks around midtillering called ‘**midseason drainage**’ was included. Water savings of up to 20% were recorded with

no loss (and sometimes increases) in grain yield. It was also shown that the rice crop required standing water around flowering.

Rice on raised beds

Two papers from India (Meerut and New Delhi) presented preliminary findings comparing the responses of rice cultivars grown on raised beds and on the flat. Results were not encouraging however it seemed there were soil 'fertility' constraints at both sites. On the contrary, an extension specialist presented encouraging results from several farmer participatory on-farm trials involving rice and non-rice crops at Ghaziabad, India, where he showed great success of growing rice on raised beds, particularly growing transplanted rice on beds.

Aerobic rice

Aerobic rice is a 'new' way for saving water in rice production in China where rice uses more than 50% of the available irrigation water. In contrast to lowland rice, aerobic rice grows in nonpuddled, nonflooded soil under high external inputs and **supplementary irrigation when natural rainfall is insufficient**. For aerobic rice to be successful, new varieties must be developed that are adapted to these specific growth conditions.

The use of irrigation water was reduced by 50% and yield has been maintained. Thus the productivity of **irrigation** water is 2-3 times higher than achieved with lowland rice. The area under aerobic rice had increased to 133,000ha in 2000.

'Special' aerobic rice cultivars, called *Han Dao*, have been developed by the China Agricultural University (CAU), Beijing.

Yang et al (CAU and IRRI) presented results from two experiments at Beijing comparing the yield potential of aerobic rice under different irrigation regimes. One experiment was grown in an aerobic soil with five irrigation regimes and the other under puddled and continuously flooded conditions. Two aerobic varieties and one lowland variety were compared and basic crop water response functions were developed. Under flooded conditions (1350 mm) the aerobic varieties yielded 23 and 39% lower than the lowland variety (8.8 t ha⁻¹); water productivity of the lowland variety was 0.65g grain kg⁻¹ water. Under the aerobic conditions water use was reduced to 650 mm and yields were lower – 5.3 and 4.7 t ha⁻¹ for the aerobic varieties and 4.4 t ha⁻¹ for the lowland variety. Water productivity was increased to 0.82 and 0.73 for the aerobic varieties whilst the lowland variety did not change.

SRI

The main features of SRI are early transplant (less than 15 days old) of single seedlings, weed control, and intermittent irrigations during the vegetative stage. Three papers based on the Madagascar experience – a review; a paper that surveyed farmer implementation of the recommended irrigation practices; and one that surveyed why farmer adoption was low and disadoption high!

Other papers reported on experiences with hybrid rice in Tamil Nadu, India, and the effect of seedling age at six sites in Indonesia.

It was important to maintain **moist** but aerated soil during the vegetative phase. After panicle initiation 1-2 cm of flood water was maintained.

The farmers in Indonesia were reluctant to only use one seedling per hill – locusts, snails etc and found that 50% more labour was required to successfully transplant the young seedlings.

In all situations reported at the workshop **early and frequent** weeding was essential.

Relevance to the Riverina

The work reported at the workshop was conducted on considerably lighter soil types than are permitted for the rice growing areas in southern NSW (and Northern Victoria). Deep drainage and seepage were much higher than experienced under our conditions. Thus most of the water savings recorded are due to a reduction in these losses rather than reduced transpiration or evaporation.

Daily and seasonal potential ET are also lower (40-50%) than experienced in the Riverina. Rainfall is also much more abundant and frequent allowing easier management of the alternate wetting and drying strategies that are being adopted.

In my opinion:

- there is no place for SRI in the Riverina;
- the potential increase in grain yield from midseason drainage should receive further evaluation;
- aerobic rice may have some potential however, under the ET regime experienced here, grain yields are likely to be substantially reduced through water deficit stress. The low temperature issue at microspore is also highly relevant, at least in the short to medium term; and
- to meet the ET requirement of the Riverina rice crop water needs to be ponded from about ten days before PI until at least the end of the first week of grain filling.

Acknowledgements

Financial support from the CRC for Sustainable Rice Production allowed my attendance at the workshop.