Nitrogen application strategies for rice

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In southern N.S.W. much of the rice crop is sown with a combine then given 3 to 4 irrigations at approximately weekly intervals. Permanent flood is applied when the rice is 15 cm high and 10-30 cm of water is left on the crop until the grain begins to mature. Earlier studies suggest nitrogen fertilizer should be applied either prior to permanent flood or at panicle initiation. Fertilizing at these exact times presents difficulties; for example it is not possible to top-dress 70 ha of rice immediately before permanent flood or precisely at panicle initiation. Therefore several experiments were undertaken to assess the importance of timing. The fertilization times used in two of these experiments are given below.

Experiment I - cultivar Calrose	Experiment II - cultivars Inga and Calrose
1. Prior to first flush.	l. Permanent Flood (PF).
2. Prior to second flush.	2. Mid Tillering
3. Prior to third flush.	3. 5 days prior to P.I.
4 days prior to permanent flood (PF).	4. At PI.
5. Immediately before PF.	5. 3 days after PI.
6. Immediately after PF.	6. 7 days after PI.
7. Late Tillering	
8. Panicle Initiation (PI).	

Experiment I. Plant samples taken at PI, heading and harvest showed timing had significant effects on tiller number, height and weight, leaf area index, straw: grain ratio and yield. Number and size of tillers increased significantly as the time between fertilisation and flooding declined. Plots fertilized immediately after flooding or at tillering had significantly fewer tillers and the tillers which were produced were stunted. While plots fertilized at PI had fewer tillers than some pre-permanent flood treatments, the grain weight per tiller and harvest index was higher. The net result was that yield from plots fertilized at PI was not significantly different from plots giving highest recorded yield (immediately prior to PF).

Experiment II. Plant samples were taken at PF, tillering, pre PI, PI, post P1, heading and harvest. Sampling at tillering showed that fertilization had resulted in significant increases in tiller number and dry weight. Plots receiving no fertilizer or fertilizer at mid-tillering produced a large number of late tillers but these were small and sterile.

On plots of Calrose, fertilization at PF produced the highest yield; with plots of Inga there was little difference between fertilizer at PF and 7 days after PL. Both varieties had yield increases of 600 kg/ha

between 5 days prior to PI and 7 days post PI. This increase was due to a combination of yield components such as grain weight, grains per head and percent fertile florets.

The results of these experiments indicate the sensitivity of rice plants to fertilization at different times. The advantages of fertilizing near either PF or PI are obvious. Future research will examine the reasons for variation in response with time.