

Nitrogen recovery and grain yield of Inga rice

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Uptake of nitrogen fertilizers by rice crops in New South Wales is considerably improved when applied just before permanent flood instead of at sowing or after permanent flood (1). This practice has produced high grain yields for the cultivar Calrose but for Inga the results have been disappointing (2). The optimum time of nitrogen application is known to vary between rice cultivars in USA (3). A field experiment was designed with the cultivar Inga to examine the effect of time of fertilizer application and nitrogen rate on the efficiency of nitrogen use in terms of grain yield.

Methods

Five nitrogen rates (0, 50, 100, 150 and 200 kg N ha⁻¹) were applied either just before permanent flood or at panicle initiation in a randomised complete block design with three replicates. Sub-samples were taken at panicle initiation and maturity to assess nitrogen uptake and yield components.

Results and Discussion

Early vegetative growth and nitrogen uptake increased with increasing nitrogen rate applied at permanent flood. At the panicle initiation stage there was no difference between nitrogen rates in percent recovery of applied nitrogen (mean recovery of 44%).

Grain yields were increased when nitrogen application was delayed until panicle initiation. Nitrogen applied at permanent flood increased yields but rates above 100 kg N ha⁻¹ resulted in a marked negative response. The negative response was mainly due to detrimental effects on floret fertility. In contrast the response to nitrogen at panicle initiation was positive and virtually the same for all rates.

At low nitrogen rates the percent recovery of nitrogen fertilizer was greater when applied at permanent flood than at panicle initiation, mainly because of greater vegetative growth when fertilizer was applied at permanent flood. Increasing nitrogen rate reduced percent recovery at both application times, the reduction being greater for fertilizers applied at permanent flood. At high nitrogen rates, time of application had little effect on total nitrogen uptake but marked differences in grain/straw ratio were recorded.

	N Rate at Permanent Flood (kg ha ⁻¹)					N Rate at Panicle Initiation (kg ha ⁻¹)				
	0	50	100	150	200	0	50	100	150	200
Grain Yield (t ha ⁻¹)	5.9	7.2	7.6	5.0	3.7	5.9	8.2	8.1	8.5	8.4
N Recovery (%)	-	74	58	36	35	-	49	51	37	39

These results show that the efficiency of nitrogen utilization by Inga in terms of grain yield is improved when nitrogen application is delayed until panicle initiation.

1. Boerema, E.B. 1974. M.Sc. (Macquarie University).
2. McDonald, D.J. 1978. *J. Aust. Inst. Agric. Sci.* 44:3-20.
3. Wells, B.R. and Johnson, T.H. 1970. *Agron. J.* 62:608-612.