

## Nutrients in runoff from irrigated pastures

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Runoff from irrigated pastures can find its way to the Murray River and any nutrients in it may pose a pollution hazard to the river as well as representing a loss of soil fertility. To quantify losses of nutrients from irrigated perennial pasture and measure the effect of fertilizer application on these losses, an experiment was carried out at Kyabram.

### Methods

Irrigation bays of established pasture grazed by dairy cattle were set up as plots 10 m x 80 m. Water samples were collected at the ends of each plot and runoff volumes recorded. Fertilizer treatments were; P0 and N0 (no fertilizer); P1 (55 kg P/ha as superphosphate, Autumn broadcast) and N1 (50 kg N/ha as ammonium nitrate, Spring broadcast). These were factorially arranged in four randomised blocks. Water samples were analysed for Total Phosphorus (TP) Dissolved Phosphorus (DP), Total Kjeldahl Nitrogen (TKN) and Nitrate Nitrogen (NO<sub>3</sub>-N).

### Results and Discussion

**Table 1. Input and output of nutrients from irrigated pasture in kg/ha/yr.**

	Treatments							
	P0		P1		N0		N1	
	TP	DP	TP	DP	TKN	NO <sub>3</sub> -N	TKN	NO <sub>3</sub> -N
Irrigation Water	2.2	-	2.2	-	10.5	0.7	10.5	0.7
Runoff	2.6	1.8	5.0	4.0	5.3	0.3	6.3	1.2
Net loss	0.4	1.8	2.8	4.0	-5.2	-0.4	-4.2	0.5

DP predominates in runoff indicating that irrigation water must extract soluble P from superphosphate, pasture plants and/or the surface soil. Runoff from the two irrigations following superphosphate application accounted for half the P lost in a year. Concentrations for TP reached 21 mg/L with DP accounting for most of TP at these two runoff events. DP remained the predominate P form in runoff from subsequent irrigations. For N, pasture was a sink except for the two irrigations after fertilization when an extra 1.9 kg of total N was lost in runoff.

Although only 4% of the added fertilizers appeared in runoff, the amounts are high enough for concern about eutrophication. However, before entering rivers, such runoff must travel along drains where the concentration is reduced. In this experiment, the concentration of nutrients in the runoff was reduced by over 500% along a 1 km drainage channel. The common practice of drainage re-use further reduces the hazard of irrigation runoff causing eutrophication problems. Therefore, it appears that irrigated pastures are not a major cause of stream eutrophication even after large fertilizer applications.