

## Magnitude and duration of the 'incidental' fertilizer effect is influenced by soil P buffering properties

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The application of phosphorus (P) fertilizers to grazed pasture systems can increase the export of P in surface runoff via systematic and incidental fertilizer effects. In Australian grazing systems, the dominant incidental effect arises from fertilizer application and can comprise a large proportion of annual P exports. The magnitude and duration of fertilizer incidental effects has been reported to vary widely, yet the soil characteristics which influence this are poorly defined. In this paper we investigate the effect of soil P buffering properties on the duration and magnitude of incidental fertilizer effects using a weak electrolyte solution as a surrogate measure of runoff P.

There was a significant ( $r^2=0.95$ ,  $P<0.01$ ) exponential decay relationship between soil P buffering and incidental fertilizer half life (Fig 1a). For soils with low P buffering capacity, fertilizer half life was up to ~3.5 days, whereas for highly P buffered soils the half life was  $<0.5$  day. Soil P buffering was also found to have a significant effect on the magnitude of the incidental fertilizer effect (Fig 1b). For soils with low P buffering, soluble soil P at  $T_0$  was  $>4$  times higher than that of high P buffering soils. In fact, the soluble P on a poorly buffered soil at  $T_{56}$  was similar to that at  $T_0$  on a highly buffered soil. Soil P buffering properties need to be considered when prescribing management actions to reduce incidental fertilizer effects. Soils with low P buffering require much more careful timing of P fertilizer application to minimize adverse environmental risks.

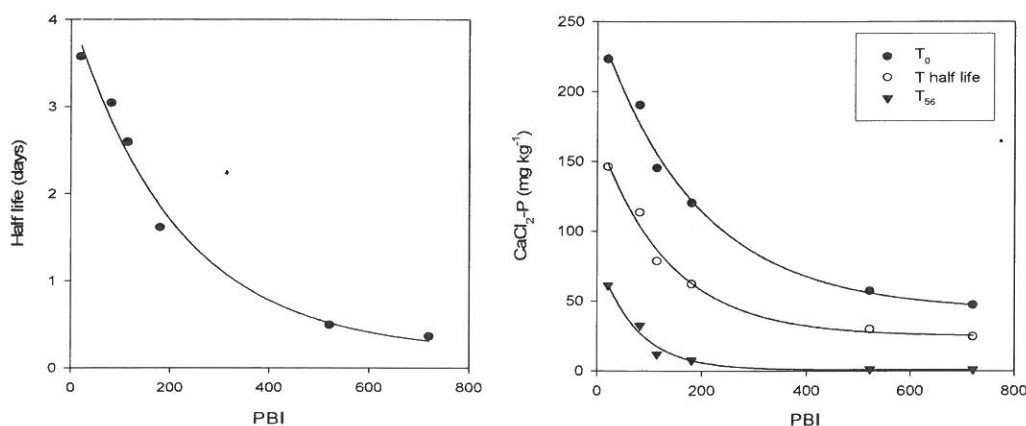


Figure 1. The effect of phosphorus buffering (PBI) on a) fertilizer half-life, and b) soluble soil P concentrations at various times after fertilizer application.