

TIME DEPENDENT VARIATIONS IN PHOSPHORUS SORPTION
PROPERTIES OF ALTERNATELY FLOODED AND DRAINED SOILS FROM
THE BURDEKIN RIVER IRRIGATION AREA, NORTH QUEENSLAND,
AUSTRALIA

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ABSTRACT

With the development of the Burdekin River Irrigation Area (BRIA) in north Queensland, Australia, it is probable some BRIA soils will be double cropped to ride and upland crops. In such a rotation, the submerged phase which occurs under rice may decrease phosphorus (P) availability to the subsequent upland crop. This study describes changes in the P sorption properties of two dissimilar BRIA soils as a consequence of a flooding (reduction) then draining (re-oxidation) cycle and, from these, indicates the direction and magnitude of likely changes in fertilizer P requirements.

Buffer capacity (PBC) was the soil P supply factor most clearly influenced by flooding. Under flood, PBC initially increased, with the rate and magnitude of the increase reflecting the redox status of the soil, especially the reduction of soil iron (Fe). At longer times under flood, PBC then decreased possibly due to slow crystallisation of freshly formed Fe(II) complexes. Upon draining, non-reversible increases in PBC were linked to oxalate-extractable Fe (amorphous and poorly crystalline Fe(III) hydrous oxides). The net effect was a possible 60% increase in fertilizer P requirements for upland crops, as indicated by the amount of sorbed P required to give $\mu\text{g l}^{-1}$ P in the soil solution.