Article title	Plant Availability of Phosphorus in Four Superphosphate Fertilizers Varying in Water-Insoluble Phosphate Compounds
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Abstract	There is concern that the use of lower quality phosphate rock can result in elevated amounts of Fe–Al–P water-insoluble compounds in fertilizers and, consequently, low agronomic effectiveness. Therefore, studies were conducted to evaluate the effect of some of these compounds on plant growth. Four commercial superphosphates varying in chemical composition (two single and two triple superphosphates) were selected for the study. Fertilizer impurities were collected as water-insoluble residues by washing each P source with deionized water. A modal analysis, based primarily on elemental chemical analysis and x-ray diffractometry, was used to estimate the chemical composition of each P source. Water-soluble monocalcium phosphate (MCP) and the water-leached fertilizer residues were prepared to give a range of fertilizers in terms of water-soluble phosphorus (WSP) (0–100% of the available P as MCP). The water-leached fractions, MCP, and the mixtures of MCP with water-leached fractions were applied to supply 40 mg available P kg^{-1} to a thermic Rhodic Kanhapludult with pH values of 5.2 ± 0.05 (unlimed) and 6.4 ± 0.08 (limed). Wheat (*Triticum aestivum* L.) grown in a greenhouse for 101 d served as the test crop. The requirement for WSP was source and pH dependent. At a soil pH of 5.2, the fertilizers required 73 to 95% WSP to reach the maximum dry-matter yield, while they required 60 to 86% WSP at pH 6.4. To reach 90% of the maximum yield, all superphosphate fertilizers required <50% WSP. These results show that it is not always necessary to have high water solubility as required by legislation in many countries.
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