

Reducing the loss of fertiliser phosphorus on soil types prone to leaching

Mr Rowan Maddern^{1,2}, Dr Dean Diepeveen^{2,3}, Dr Bradley Smith⁴, **Dr Deborah Pritchard**¹

¹Curtin University, ²Murdoch University, ³Department of Agriculture and Food Western Australia, ⁴CSBP Limited

Phosphorus (P) in fertiliser applied to sandy soils is prone to leaching and hence warrants careful management. Eutrophication has occurred where excess P has entered waterways, for example, the Swan Coastal Plain in south-western Australia. Superphosphate fertiliser is responsible for much P used for agriculture; P leached into river systems in this region estimated at 26 tonne P per annum. Modification of the chemistry of superphosphate, characterised by a high percentage of water-soluble P (86%) to create fertiliser containing a lower percentage of water-soluble P (35%) was tested in two experiments to quantify P leaching in an aim to reduce P loss. The first experiment comprised six fertiliser P treatments: superphosphate, low water-soluble superphosphate, three standard forms of phosphate and a control to leaching columns containing perlite. Over 4 weeks following a total of 900 mm simulated rainfall, cumulative recovery of total P in leachate in low water-soluble P was 40% compared to superphosphate at comparable rates of total P. The second experiment tested the leaching of P following the addition of superphosphate, low water-soluble superphosphate and a control to three different soil types differing in P buffering index (PBI) (low, medium and high) following 900 mm simulated rainfall. The concentration of P in leachate decreased for both fertiliser treatments as the PBI of the soil increased, as would be expected. Total P recovered in leachate in the low water-soluble superphosphate treatment was less compared to the superphosphate treatment on the low PBI soil (64% and 111%, respectively) and medium PBI soil (5.4% and 37.5%, respectively). The concentration of P in leachate in the high PBI soil for both fertiliser treatments was low. Low water-soluble superphosphate reduced P leaching compared with traditional superphosphate fertiliser on soils at risk of leaching.