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Adsorption characteristics of Brilliant Blue in soils of a lateritic landscape

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Brilliant Blue has been widely used as a dye tracer for mapping solute transport through soils due to its high visibility and low toxicity. As most studies of Brilliant Blue sorption has been carried out on young soils of the northern hemisphere, this study focuses on the sorption of Brilliant Blue on highly weathered acidic soils of a lateritic landscape in the south-west of Western Australia. Brilliant Blue adsorption studies were carried out on 13 different soils ranging from sands to clays. Batch experiments using 1:6 soil to solution ratio with Brilliant Blue concentration ranging from 0 to 5 g/L were carried out in triplicates. Soil properties such as texture, surface area, mineralogy of the clay fraction, amorphous iron and aluminium, total iron and aluminium, cation exchange capacity, pH, electrical conductivity and total carbon were determined to characterize the soils. Sorption isotherms were successfully described with the Freundlich equation. Significant positive relationships were determined between the sorption coefficient, Kf , and surface area, iron , and aluminium. Compared to previous studies we found very high sorption affinity of Brilliant Blue to soils of the lateritic landscape with oxides of iron and aluminium being highly correlated with the parameters of the Freundlich equation. A complementary field study revealed that the wetting front was progressing much faster then the dye front which makes the interpretation of dye pattern more complex.