

Ironstone gravel types in Western Australia: Re-purposing a geological survey to improve soil management

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The deeply laterised landscapes of Western Australia's wheatbelt contain large amounts of ferruginous concretions or pisoliths, referred to locally as ironstone gravel. Soil surveys over the years have described ironstone gravel presence and abundance, and the state soil classification system recognises their importance in agriculture by designating 'ironstone gravel soils' at the highest level of the classification hierarchy. These gravels have generally been assumed inert in agricultural soils; however, farm trials and anecdotal experience suggest they may play a more active role in nutrient and water retention than previously recognised. Gravelly soil performance under dryland agriculture varies dramatically across the wheatbelt, and management strategies are needed.

As a first step toward investigating the role of ironstone gravels in agricultural production systems, we have analysed a published pisolith dataset (Cornelius et al, 2006) originally collected for geological exploration to identify statistically different ironstone gravel types based on geochemistry, and mapped their spatial variation. The dataset consisted of approximately 2000 samples collected on a 9-km triangular grid over the southwestern Yilgarn Craton; fifty-three elements were measured. Numerical classification and ordination techniques (PATN) were used to simplify these data and identify a small number of gravel types. Combined with a stack of environmental surfaces, such as gamma radiometric imagery and landform characteristics derived from a digital elevation model, we mapped the extent of different ironstone gravel types over the Western Australian wheatbelt. These patterns reflect geomorphology, climate, and variations in parent materials. From these maps and interpretations, we selected type locations for gravelly soils for sample collection to support further investigation of ironstone gravel properties related to agricultural management.

Cornelius, M., Morris, P.A. and Cornelius, A.J. 2006. Laterite geochemical database for the Southwest Yilgarn Craton, Western Australia. Open File Report 201, Cooperative Research Centre for Landscape Environments and Mineral Exploration, Perth, Australia.