Identification and Classification of “New” Semi-Arid Soils from the Pilbara WA with Potential Additions to the Australian Soil Classification

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As part of the Department of Primary Industries and Regional Development’s (DPIRD) Transforming Agriculture in the Pilbara (TAP) project, a land assessment of the region was conducted to identify areas with potential for irrigated agriculture. The morphology of the dominant soils is described together with their chemical and physical properties. A digital soil map was generated to identify the spatial extent of the soil generic groups. There is a paucity of georeferenced soils data in Australia’s semi-arid to arid regions and soil spatial distribution is at best broad scale. This presentation highlights some soil characteristics of the Mount Newman semi-arid region and identifies a need for further investigation. The soils of the region are commonly red (10R to 5YR hues), which is typical of semi-arid climates. Siliceous red-brown hardpan soils (Duric Red-Orthic Tenosols) are locally common on level to very gently inclined plains. The hardpan is impregnated with iron-manganese coatings and laminae. These coatings also variably cement soil aggregates in other soils. Dominant soils are: Red Kandosols (40%); Self-mulching Red Vertosols and Vertic-Red Dermosols (19%); Red-Orthic Tenosols (16%). Contrary to Australian Soil Classification (ASC) soil distribution maps, Sodosols (<1%) are not common. Both Vertosols and Dermosols exhibit surface cracking and gilgai micro-relief and a have similar structure and morphology. In this situation, Dermosols are distinguished from Vertosols only by having a surface field texture of clay loam rather than clay. Including these soils within the Vertosol order would be warranted. Under the semi-arid to arid climate, dark A horizons are often absent or only distinguished by a thin physical or biological crust. The lack of a dark A horizon (ochric epipedon) is currently not distinguished in the ASC while crusts are only noted as a surface condition with no reference to depth. Literature generally attributes biological crusts (cryptogam) to healthy ecosystems where it reduces evaporation and improves infiltration however, physical and biological crusts may reduce infiltration, exacerbate sheet flow and soil erosion in landscapes subject to disturbance. Inclusion of B2 horizon depth, as a Family criterion, for Tenosols, Kandosols and texture contrast soils would highlight agronomic potential in both irrigated and dryland agriculture.