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Gravel – inert waste or part of the soil?

Matthias Leopold (1), David Weaver (2), and Craig Scanlan (2)

(1) University of Western Australia, School of Agriculture and Environment, PERTH, Australia (matthias.leopold@uwa.edu.au), (2) Department of Primary Industries and Regional Development, PERTH, Australia

In soil science, gravels are generally defined as material larger than 2 mm in diameter. They have been reported as an important component in the physical stability of a soil in terms of shear strength or preventing compaction. However, in soil chemical analysis gravels are usually separated and largely treated as waste since they are considered to be chemically inert and to have a small surface area.
In south-west Western Australia (SWWA), an important agricultural region with Mediterranean climate and over eight million ha sown for grains, many top- and subsoils have a sandy textured fine earth fraction (<2 mm), and are nutrient poor in their native state. Large parts of SWWA have been enriched in iron and associated elements and formed thick lateritic crusts. Ironstone gravels are a weathering product of the laterite and they are incorporated in nearly 25% of all soils under agricultural production in SWWA.
Ironstone gravels accumulate a mixture of clay minerals (kaolinite) and iron-manganese at the surface as powder X-Ray diffraction analysis show. Whilst the gravel bulk is often impermeable, surface materials (rinds) of gravels show varying levels of surface porosity. These properties can influence hydrologic and chemical properties especially in sandy soils. Results on basic hydrological properties (water holding capacity, water contents, matrix potentials), some chemical properties such as phosphorus adsorption and desorption as well as the mineralogical composition of the surface of the ironstone gravels suggest they can influence properties of the whole soil. Scanning electron microscopy (SEM) provides 2D visual confirmation of the porous surface structure of the Ironstone gravels and integrated EDX mapping clearly shows adsorption along the surface after treatment with phosphorus.
The above study shows that ironstone gravels in SWWA can be a valuable soil component in dryland agriculture, influencing hydrological and chemical behaviour of the whole soil. They are far from being inert and should be considered in soil analysis in the future.