

Chemical Characterization of Indurated Layers in Some Soils of Saudi Arabia

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Abstract. Indurated subsoil layers are common features in the soil profiles of arid and semi arid regions. They are compact with or without definite cementations. They are impermeable to root and water, and considered one of the major soil limitations for agriculture development. This study was undertaken to chemically characterize these layers in representative profiles collected from both Al-Qassim and Al-Hassa regions using chemical extraction methods. Results indicate that HCl was the most effective solution in slaking the clods of the indurated layers of Al-Qassim region. No slaking in water or NaOH was observed in the indurated layers except few samples. Sodium citrate-bicarbonate-dithionite (CBD) extract indicated low to moderate slaking of the dried clods, while other extracts resulted in no slaking, slight slaking or low to moderate slaking of the indurated layers. Results of dissolution indicated that calcium carbonate was the main cementing material with or without varying proportions of amorphous silica, free iron oxides, and amorphous alumina. Results of slaking of Al-Hassa soils resulted in moderate slaking or complete slaking with HCl of the indurated layers. Complete slaking was recorded with the other reagents except few samples. The main cementing material is calcium carbonate with relatively higher proportion of amorphous alumina, silica and free iron oxides. Traceable amounts of Mn were detected in CBD extractions. Differences between the indurated layers of the studied regions were related to the chemical nature of cementing materials particularly in the amount and kind of amorphous materials. The responses to the agromanagement practices can be predicted in areas having indurated sub-surface layers, which characterized by their slaking in water.