



## **Effect of rock fragment addition on hydro-dispersive properties of compacted soils**

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Compaction of agricultural soils is an increasingly challenging problem for crop production and environment. Mechanization of agricultural practices is one of the main factors inducing degradation of soil structure, especially in fragile soils with little organic matter and low shrinking-swelling capacity. Moreover, rock picking from stony soils is a routine practice to avoid tillage problems in some agricultural productions, but stone removal can significantly increase soil compaction, which lowers water infiltration rates and increases surface runoff and soil erosion. The practice of crushing and returning smaller rock fragments to the field could reduce the above problems.

The aim of this work was to test the addition of rock fragments as practice to restore soil physical quality of not-stony soils susceptible to compaction. We carried out a lab experiment mixing five different volume concentrations (5%, 10%, 15%, 25% and 35%) of 4-8mm rock fragments with an Alfisol and an Entisol, showing compact structure and water stagnation problems in field. The repacked samples have undergone nine wet/dry cycles in order to induce soil structure formation and its stabilization. Bulk density, porosity and soil hydraulic properties and hydro-dispersive characteristics were measured. Soil hydraulic properties, namely water retention and hydraulic conductivity, were inferred from an infiltration experiment performed by a tension infiltrometer disc coupled with an inverse parameter estimation method; hydro-dispersive characteristics were performed from a tracer inflow-outflow experiment conducted in unsaturated condition, followed by the analysis of the breakthrough curve. Soil image analysis was used to enhance parameterization of the hydrological models near saturation. Preliminary results showed that bulk density significantly changed only after addition of 35% of rock fragments and a good physical restoration was reached at 15% volume concentration in Entisol and at 25% in Alfisol where hydro-dispersive characteristics strongly changed.