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Improving hydraulic properties of sandy soil with lime powder addition

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Sandy soils have low water holding capacity. However, the addition of lime in sandy soil profiles may be associated with higher water retention capacity which could improve efficiency in agricultural water use. Using lime for soil amendment is not usually a sustainable method because of the appreciable required energy and natural resource to produce it; nevertheless, the presence of lime as industrial waste in the region makes this procedure a cheap way of soil amendment; additionally it offers a solution to the environmental problems of the industrial waste deposition. Adding lime can change soil structure and affects hydraulic properties. Saturated hydraulic conductivity and soil water retention curve are the most important hydraulic properties of a soil. Therefore, we investigated the effect of lime addition to a sandy soil expecting to improve its hydraulic properties. The laboratory experiment was conducted by adding six levels of lime (0%, 5%, 10%, 15%, 20% and 25% by volume) to the sandy soil, laid out in completely randomized design with three replications. The saturated hydraulic conductivity was obtained in the laboratory, using KSAT apparatus and the soil water retention curve data was measured through HYPROP apparatus (UMS®). The van Genuchten relationships were adopted to describe soil hydraulic properties. Preliminary results showed that application of lime as soil amendment decreased saturated hydraulic conductivity, and field capacity and plant available water were increased. The results also showed that by adding lime to the sandy soil, the retention curve slightly moved toward X-axis direction, increasing the air-entry value. Parameters α, n and m from the van Genuchten model decreased by increasing the addition of lime to the sandy soil. It is concluded that the addition of lime, a low cost solution, can improve hydro-physical properties of sandy soil and it has the potential improvement of water delivery to plants.