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Characterizing the spatial variability of soil infiltration using apparent electrical conductivity

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Implementation of irrigation systems and models of water flow and solute transport, requires continuous and accurate hydrological information. Apparent electrical conductivity (ECa) has been used to characterize the spatial behavior of soil properties. The objective was to characterize the spatial variability of soil infiltration at farm scale using ECa measurements. ECa measurements of a 42 ha farm were collected for the top 0-30cm (ECa(s)) and 0-90cm (ECa(d)) soil using the Veris® 3100. ECa maps were generated for both depths, using geostatistical interpolation techniques. From these maps, three general areas were delineated, named High, Medium, and Low ECa zones. At each zone, three sub samples were collected. Infiltration, altimetry (Alt) and effective depth (ED) were measured. Soil samples were taken at two depths 0-30 (Sh) and 30-60 (Dp). Bulk density (δb), clay content and organic matter (OM) were analyzed. Infiltration rate (i) was estimated using a disc infiltrometer. Soil series were Petrocalcic Paleudoll and Typic Argiudoll. Spatial variability of soil properties were analyzed by descriptive statistics. High ECa zones showed greater Alt and lesser ED. Likewise, Sh and Dp soil samples had greater δb and clay content, and lesser OM content. Medium and Low ECa zones were situated at similar areas of Alt and ED. Likewise, δb and OM content showed similar values at the two studied depths. In the Medium ECa zone, clay content was higher in Sh sampler. In general, the lowest i was in the High ECa zone, while in Medium and Low ECa zones, i values were similar. ECa was associated with clay content and OM, therefore with δb and i. It is concluded that spatial variability of soil infiltration could be characterized through ECa.