



A Drainability Index for Layered Soils

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Contrasting hydraulic properties of natural multi-layered soils complicate an a priori prediction of drainage without numerical modeling or field experiments. A convenient index depending on the water retention curve and hydraulic conductivity of layers was developed to describe soil drainability and allows proper and rapid in situ decisions regarding water and fertilization management. The index called “Soil Drainability Index” (SDI) consists of the sum of water storage and relative hydraulic conductivity for all layers at an arbitrary value of field capacity. SDI was tested using results of a comprehensive simulation of drainage occurring under real conditions with annual drainage for eight soils from São Paulo State, Brazil and 38 years of weather data under bare soil and grass covered lands with three different rooting depths (30, 60 and 90 cm) using the HYDRUS-1D model. Under simulated conditions, the annual average of bare soil drainage of all eight soils was 73.2 ± 39.3 cm y⁻¹ while under grass scenarios these amounts reduced by 32, 43 and 47% due to root water uptake ranging from 76.1 and 84.4 to 88.6 cm y⁻¹ (standard deviations around 3.5 cm y⁻¹). The new conceptual soil drainage index SDI, based on an estimate of field capacity corresponding to a pressure head of 100 cm or 330 cm showed excellent agreement (more than 90% accuracy) to simulation results, and may therefore be used to estimate drainability of layered soils.