



Impact of anthropomorphic soil genesis on hydraulic properties: the case of cranberry production

Yann Periard (1), Silvio José Gumiere (1), Alain N. Rousseau (2), Jean Caron (1), and Dennis W. Hallema (1)

(1) Université Laval, Faculté des sciences de l'agriculture et de l'alimentation, Département des sols et de génie agroalimentaire, Québec, Canada, (2) Institut national de la recherche scientifique : Centre Eau, Terre et Environnement, Québec, QC

The construction of a cranberry field requires the installation of a drainage system which causes anthropic layering of the natural sequence of soil strata. Over the years, the soil hydraulic properties may change under the influence of irrigation and water table control. In fact, natural consolidation (drainage and recharge cycles), filtration and clogging soil pores by colloidal particle accelerated by water management will alter the hydrodynamic behavior of the soil (Gaillard et al., 2007; Wildenschild and Sheppard, 2013; Bodner et al., 2013). Today, advances in the field of tomography imagery allows the study a number of physical processes of soils (Wildenschild and Sheppard, 2013) especially for the transport of colloidal particles (Gaillard et al., 2007) and consolidation (Reed et al., 2006; Pires et al., 2007). Therefore, the main objective of this work is to analyze the temporal evolution of hydrodynamic properties of a sandy soil during repeated drainage and recharge cycles using a medical CT-scan. A soil columns laboratory experiment was setup in fall 2013, pressure head, input and output flow, tracer monitoring (KBr and ZrO₂) and tomographic analyses have been used to quantify the temporal variation of the soil hydrodynamic properties of these soil columns. The results showed that the water management (irrigation and drainage) has strong effect on soil genesis and causes significant alteration of soil hydraulic properties, which may reduce soil drainage capacity. Knowledge about the mechanisms responsible of anthropic cranberry soil genesis will allow us to predict soil evolution according to several conditions (soil type, drainage system design, water management) to better anticipate and control their future negative effects on cranberry production.

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