



Sensitivity of drainage efficiency of cranberry fields to edaphic conditions

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Water management on a cranberry farm requires intelligent irrigation and drainage strategies to sustain strong productivity and minimize environmental impact. For example, to avoid propagation of disease and meet evapotranspiration demand, it is imperative to maintain optimal moisture conditions in the root zone, which depends on an efficient drainage system. However, several drainage problems have been identified in cranberry fields. Most of these drainage problems are due to the presence of a restrictive layer in the soil profile (Gumiere et al., 2014). The objective of this work is to evaluate the effects of a restrictive layer on the drainage efficiency by the bias of a multi-local sensitivity analysis. We have tested the sensitivity of the drainage efficiency to different input parameters set of soil hydraulic properties, geometrical parameters and climatic conditions. Soil water flux dynamic for every input parameters set was simulated with finite element model Hydrus 1D (Šimůnek et al., 2008). Multi-local sensitivity was calculated with the Gâteaux directional derivatives with the procedure described by Cheviron et al. (2010). Results indicate that drainage efficiency is more sensitive to soil hydraulic properties than geometrical parameters and climatic conditions. Then, the geometrical parameters of the depth are more sensitive than the thickness. The drainage efficiency was very insensitive to the climatic conditions. Understanding the sensitivity of drainage efficiency according to soil hydraulic properties, geometrical and climatic conditions are essential for diagnosis drainage problems. However, it becomes important to identify the mechanisms involved in the genesis of anthropogenic soils cranberry to identify conditions that may lead to the formation of a restrictive layer.

References:

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