Soil hydraulic properties spatial datasets of Victoria

MA Rab[1], C Beverly[1], M Davey[1], CD Aumann[1], DB Rees[1], S Chandra[1]
[1]*Agriculture Research Division, Department of Economic Development, Jobs, Transport and Resources*

Water retention and hydraulic conductivity are important soil hydraulic properties that govern the functioning of soil in ecosystems and are affected by soil management. Knowledge of the hydraulic characteristics of soils is essential for many plant and soil–water studies including plant growth, plant–water stress, solute movement, deep drainage and irrigation scheduling. Victorian Government continues to invest in modelling activities that require robust soil hydraulic properties to test, understand and design future farming systems for Victoria. However limited hydraulic data exists to support the current range of farming system models such as Agricultural Production Systems sIMulato (APSIM), Catchment Analysis Tool (CAT), Soil & Water Assessment Tool (SWAT) and Soil Water Atmosphere Plant (SWAP). Therefore, the objective of this study is to provide soil hydrological spatial datasets for selected agricultural regions of Victoria in accessible format for easy integration into spatial software and predictive biophysical models. The interim data set provided here includes measured soil hydrological properties and derived hydrological parameters for A and B horizons of dairy pasture soils. The dryland dairy pasture soils are from Gippsland and South West Victoria regions. A total of 30 dairy paddocks were sampled representing these two regions and three to four dairy grazing management practices. This data set contains soil hydrological properties and parameters on a total of 552 A-horizon and 552 B- horizon samples. Soil hydrological properties and parameters provided include solum depth, thickness of A and B horizons, bulk density, saturated hydraulic conductivity, field capacity, permanent wilting point, volumetric soil-water content at nine matric potentials, soil porosity and soil-water retention parameters (e.g. van Genuchten parameters). In addition, this data set provides some basic soil properties including particle size distribution and chemical properties including organic carbon content. Soil hydraulic properties varied with soil types, soil texture classes and soil depths. For example, organic carbon content, bulk density and soil water content at field capacity and permanent wilting point ranged from 0.23 to 15.9 %, 0.52 to 1.85 Mg m-3 , 0.087 to 0.627 m3 m-3 and 0.015 to 0.450 m3 m-3 respectively. van Genuchten soil water retention function parameters wcr (residual water content) , wcs (saturated water content) alpha and n ranged from 0.074 to 0.227 m3 m-3, 0.422 to 0.708 m3 m-3, 0.024 to 2.79 cm-1 and 1.11 to 2.86 and respectively.