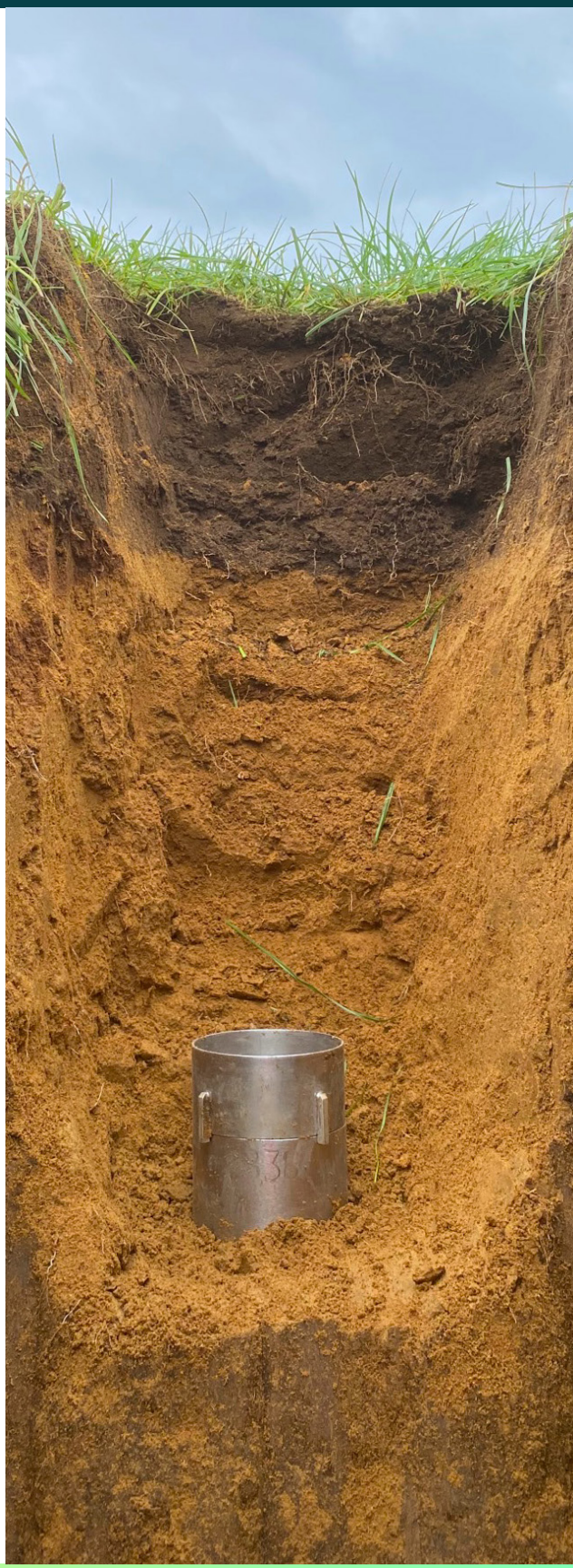
Bioeconomy Science Institute™

Soil physics laboratories

The Soil Physics Laboratories are operated by the Soil and Landscapes team at the Bioeconomy Science Institute and are based at Palmerston North and Hamilton.

The laboratories offer a range of tests covering laboratory and field physical analyses of soils. Clients include regional and district councils, environmental consultants, other researchers, universities, and businesses needing to comply with land resource consents.
The laboratories also provide support for research conducted within the Bioeconomy Science Institute.

Please contact us to discuss a set of analyses customised to meet your needs.



Laboratory tests

- Particle size analysis (sand/silt/clay, stones)
- Dry bulk density, particle density, total porosity, macroporosity
- Water release characterisation (available water capacities, field capacity, air capacity, wilting point)
- Volumetric water contents at a range of applied matric tensions (0–1500 kPa)
- Hydraulic conductivities (saturated and/or unsaturated hydraulic conductivity) at a variety of matric tensions (e.g. K–20, K–40, K–100)
- Soil engineering measurements (liquid and plastic limits, miniature compaction tests*)
- Other analyses; potting media analyses, green roof and raingarden substrate analyses*, water-stability of soil aggregates*, aggregate size*, air permeability*
- Field determinations (infiltration rates, hydraulic conductivities#, cone penetration resistance*, oxygen diffusion rates*, plant root distribution*)

* Available only at Palmerston North

Available only at Hamilton

Particle size distribution (sand, silt, clay, and stone content)

Particle size distribution is important as it affects the ability of a soil to store and transmit water. It therefore affects plant growth and production, soil, air and gas movement (including greenhouse gases), carbon and nutrient loss and cycling, and soil drainage and infiltration.

Moisture release and water storage

Moisture release analyses relate soil water content to matric potential. Undisturbed core samples are saturated and subjected to controlled draining up to a matric potential of -1500 kPa.

Macroporosity and air capacity measure the larger size fractions of soil pores, which are useful to help assess soil physical health, including soil compaction. Macroporosity is used in regional and national soil quality monitoring. The use of terminology can vary.

There are several measurements of water storage, useful for plant production, and farm and environmental modelling. Available water capacity (AWC) describes the amount of water that can be stored that is potentially available for plant growth. The AWC of soil is important for the management of irrigation, effluent application, cultivation, and to estimate soil water balances for modelling crop water needs and environmental effects (such as nutrient leaching).

AWC is generally considered to be between field capacity (-10 kPa) and permanent wilting point (-1500 kPa). Readily available water capacity (RAWC) is the difference between field capacity (-10 kPa) and the 'stress point' (-100 kPa), where a plant becomes stressed. RAWC and AWC are useful for irrigation management.

Hydraulic conductivities

Saturated hydraulic conductivity is the rate at which soil conducts water when saturated, i.e. all soil pores are full. Intact cores are expertly sampled and prepared. Unsaturated hydraulic conductivity is the rate at which soil conducts water, when pores down to a certain size are non-conducting, i.e. empty.

Saturated and unsaturated hydraulic conductivities are useful to help evaluate soil pore connectivity and functionality of selected sizes of soil pores.

For further descriptions and methods for any of the analyses, please refer to our website.

landcareresearch.co.nz/partner-with-us/laboratories-and-diagnostics/soil-physics-laboratory

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