

Why is it important to know the infiltration rate of your soil?

Irrigation water is wasted when irrigation application rate exceeds the soil infiltration rate and may result in surface ponding, surface redistribution and uneven wetting of the soil. Typical soil infiltration rates are given in the table.

FAO basic Infiltration rates for various soils¹

Soil type	Basic infiltration rate (mm/hour)
Sand	< 30
Sandy loam	20 – 30
Loam	10 – 20
Clay loam	5 – 10
Clay	1 – 5

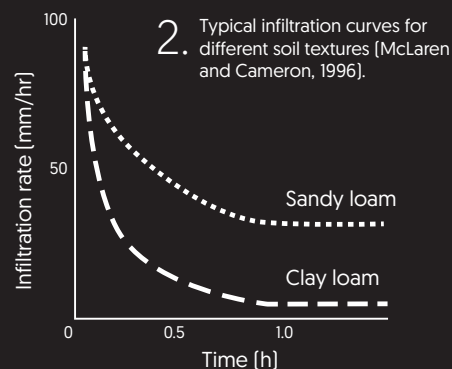
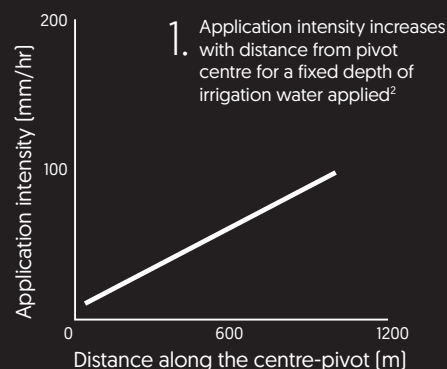
Irrigation application rate increases along the length of a centre pivot, with a fixed depth delivered over a shortening period of time with distance from the pivot centre [See Fig. 1]. It is calculated using a relatively simple formula that uses known factors such as (i) radial distance from the pivot centre and (ii) wetting width of the nozzle pattern at a specified radial distance.

However the measurement of soil infiltration rate is much less straightforward due to (i) dynamic changes in soil pattern and (ii) soil response through time to water application. Infiltration rates are strongly dependent on factors such as soil structure and land management. On-farm measurements are generally recommended.

¹ Irrigation Water Management: Irrigation Methods Training Manual No. 5 Brouwer C, Prins K, Kay M, Heibloem M FAO Land & Water Development Division. <http://www.fao.org/docrep/S8684E/S8684e00.htm#Contents>
² Powers J W (2012) Defining practical limits for centre-pivot length and irrigation management on Lismore soils. Thesis submitted in partial fulfillment of PhD, Lincoln University, 2012, 125p



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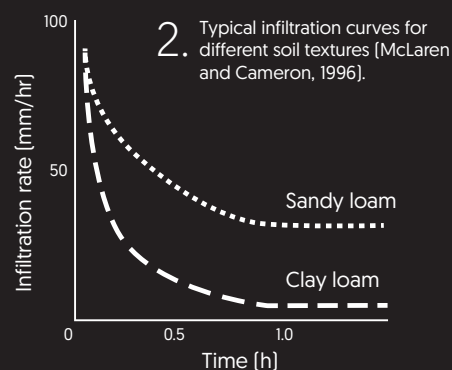
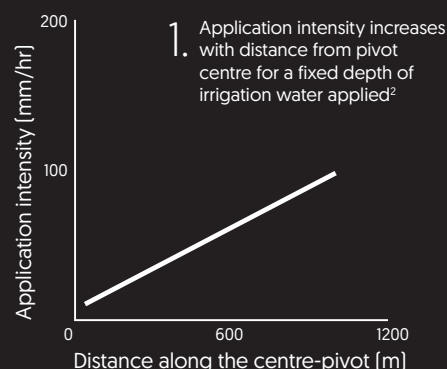
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3. Field assessment of soil infiltration rate



4. Rapid Soil Infiltration Estimation System

Field method

An existing field method is offered as a commercial service by Manaaki Whenua – Landcare Research to assess field infiltration rates (Fig. 3), but it is rather time consuming and costly. It uses a set of infiltrometer rings of different diameters pressed into the soil. A constant head of water is maintained equally in both rings, and the rate at which this water infiltrates the soil in the central ring is measured. The water in the outer ring helps prevent lateral flow.

More details here: <https://www.landcareresearch.co.nz/resources/laboratories/soil-physics-laboratory/services-offered/field-services>

Smart Phone Soil Test

Recently, Manaaki Whenua – Landcare Research has developed an accurate and rapid soil infiltration estimation method (Fig. 4) that uses a smart phone app and soil test bed. The smart phone app controls water level and moisture content of the soil sample and then automatically records the rate of infiltration and how it may decrease with time (e.g. Fig. 2).

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