



Measuring infiltrability in an Australian dryland soil: inconsistent results from ponded cylinder infiltrometry and simulated rainfall over small plots.

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Dryland soils present challenges to the field measurement of infiltrability, which may include stoniness, brittle surface seals and crusts, high mechanical strength, tendency to slake rapidly, and changes in properties arising during desiccation and re-wetting. In a contour-aligned mosaic shrubland, soil infiltrabilities were measured on initially dry soils using simulated rainfall of moderate intensity (10 mm/h), on plots 0.5 x 0.5 m. Experiments were run until runoff had stabilised and infiltrability was then calculated as the difference between the equilibrium rainfall and runoff rates. The plots were allowed to dry, following which ponded cylinder infiltrometer tests were carried out within the boundaries of each plot. These used cylinders of 100 mm diameter and ponding depths of 10 mm. Cylinder tests suggested infiltrabilities averaging 11.5 mm/h (range 2.2 - 37.1 mm/h). In contrast, the rainfall simulation plots yielded a mean of 4.2 mm/h (range 2.74 - 7.63 mm/h). Across 14 plots, test results from the two methods were moderately well correlated ($r^2 = 0.7$). Apart from differences in the areal scale of the tests (plot area was ~ 32 times cylinder area) and probably greater evaporative loss from splash droplets (plots), the major reason for the differing results appeared to be the absence of droplet impacts and seal formation in ponded tests. Though the ranking of sites in terms of infiltrability did not differ greatly with the method of measurement, the differing absolute values are important. Ponded tests suggest that little overland flow would arise in the local climate, whilst the plot results suggest that moderately frequent rainfall events would exceed soil infiltrability. The next phase of this work is to examine the significance of imposed rainfall rate and the temporal variability of rainfall on the apparent soil infiltrability, using data derived from local pluviograph records.