

An inexpensive high resolution weighing lysimeter

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This paper describes a high resolution weighing lysimeter for soil monoliths which costs less than \$200.00 to build. It is capable of resolving changes in soil moisture one order of magnitude smaller than most other weighing lysimeters (e.g.]). It uses a soil monolith to preserve the natural soil structure, physical properties and root distribution.

Methods

Five square-section steel casings (600 x 720 x 1100mm) with a 6mm wall thickness were driven into the sample site with a front end loader. The surrounding soil was dug away and the monolith lifted free of the soil profile. A 6mm thick steel base plate with 48 regularly distributed 10mm diameter drainage holes was attached to the bottom the casing. Below the base plate a drainage tank with a sloping (7.9°) base was attached to capture percolant. Holes were dug and steel pit liners were installed in the field plots. The lysimeters were then lowered into the pit liner so its top was flush with the surrounding soil surface.

Measurement of changes in soil moisture was achieved using a mobile lifting apparatus comprising a steel frame, load cell, signal amplifier with a zero offset and gain of 1000 and a digital voltmeter. With a lysimeter weight of 750kg it could resolve to changes of 0.043kg (0.0057%) or 0.1mm soil moisture equivalent.

Results

Five lysimeters were used to study the water use of the vernalizing wheat cultivar Quarrion over two seasons each with four sowing dates. Lysimetric data were compared with pan evaporation (ET_p) data and four Methods of estimating evapotranspiration. These data agreed best = 0.87) with Thom and Oliver's (2) formula and least with the ET_p (r = 0.12) which is consistent with the findings of Watts et al. (3).

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