Modelling the potential root water extraction ratio in soil: application to sugar cane on the Island of Réunion
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While very little is yet known about the root system depth of sugar cane, the study set out to model the potential root extraction ratio in soil (PRER), by counting root intersections (RI) obtained using the trench-profile method (TPM), to infer the spatial distribution of sugar cane root length densities (RLD) and root distances (RD).

The experiment was conducted in a deep clayey cambisol in Réunion. RI values were counted using a grid with a 5 x 5 cm mesh, down to a depth of 4 m over a 1.5 m wide soil profile.

The results revealed: i) wide variability in root distribution between the soil surface and root front (4 m), with many competing roots and other rootless zones over distances of more than 5 cm, ii) the PRER, calculated as the ratio of the volume of soil available to a root for water uptake to the volume of soil assigned to that root, ranged from 80% near the surface to values between 30% and 1% between 1 and 3 m, iii) if RLD mean values were used to estimate usable water, as is often the case in crop models, the values were overestimated, with an even greater gap when only depth of the root front was accounted for.

It is thought that the PRER approach may be an indicator of crop functioning under water stress and may facilitate the identification of genotypes able to withstand drought, as reported by Nidichao et al., (2011) for oil palm.

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