Integrating scattered trees into grazing landscapes to manage soil sustainably

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Acting as keystone structures, scattered paddock trees play an important ecosystem service in the Australian grazing environment through influencing their immediate environment both above- and below-ground. Since these trees are rapidly being lost from the landscape, there is a need to understand their functions more fully in order to manage the landscape in a sustainable manner. This study aims to quantify how single trees influence the soil resource with depth, and to investigate the spatial extent of this influence. Once these aspects have been quantified, the optimum distribution required to remediate depleted soil conditions can then be estimated.

Three isolated trees were comprehensively examined for their influence on soil chemistry to a depth of 75cm and to a radial distance of more than 3.5 canopy radii. Soil moisture, total C, N and S, extractable P, pH (1:5 CaCl2 & H2O) and EC were examined. The trees modification on soil condition was strongly dependent on the soil property examined, although typically values were higher under the tree at the surface and diminished with distance both horizontally and vertically. We conclude that single trees significantly improve soil condition and that a distance of 2.5 canopy radii is sufficient to explain the spatial influence of scattered trees.

Further work is now underway to elucidate the processes that influence soils around these trees. This work will link pasture productivity and pasture quality with soil attributes in order to fully quantify the ecosystem services these trees provide in order to sustainably manage this environment, both above- and below-ground.