



## **Edible Tillage Tools: The Role of Root Tapering on Agricultural Soil Properties**

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In the grand catalogue of tillage tools, the tap-root is the only one that's edible which means not only does it have valuable roles to play in conditioning a range of soil properties, but it can contribute to the growing global demand for food and feed. In Soil Science, the morphology of tap-roots is understudied, with more focus often being devoted to fibrous varieties. In addition, the rhizosphere is often considered to be the only pedospheric zone where the interactions between roots and soils are significant. However, some tap-roots have interesting impacts on bulk soil physical and hydrological properties, demonstrating similar results to more conventional tillage practices. We present, for the first time, the results of an investigation into the effects of tap-root tapering on bulk soil properties. A range of crops, representing different rooting morphologies, were planted on an agricultural plot in Norfolk and a range of soil parameters were measured from the proximal bulk soil. It was found that coarser root segments gave rise to bulk soils of lower bulk densities and higher infiltration capacities brought about, we suggest, by root-induced soil fragmentation. Tapered segments, on the contrary, exerting lower radial disturbance on bulk soils, gave rise to less soil fragmentation. We therefore conclude that the effectiveness of the root as a biotillage tool is partly dependent on meso-scale root parameters such as tapering. Furthermore, we suggest that these root-soil interactions can be used as a lighthouse example of a more sustainable approach to soil tillage.