Applied Tree Biology

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Most tree roots (whether measured by weight or length) occur in the upper portions of the soil. Oxygen and mineral nutrients are more readily available closer to the soil surface and the interception of rainfall favours a relatively shallow root system. For most trees, the top 50 cm of soil hosts 80–90% of root biomass and 90–99% is in the top 1 m (Figure 4.13). Maximum rooting depths do vary, however. In temperate trees, this tends to range 2–8 m in conifers and 2–4 m in deciduous species. At a global scale, particularly in dry environments, roots have been found exceptionally deep in the soil (Figure 4.14). Mediterranean trees, particularly oaks *Quercus* spp. and eucalypts *Eucalyptus* spp., are often thought of as having particularly deep roots, presumably because they often experience long periods without rain and require access to deep-soil water to survive. However, the Natal fig *Ficus natalensis* holds the current record: its roots were found at an astonishing depth of 120 m in the Echo Caves, Mpumalanga, South Africa. Other species noted for their particularly deep roots are the shepherd's tree *Boscia albitrunca*, which was found with roots located 68 m under the Kalahari desert, and two other species, *Vachellia erioloba* (previously called *Acacia erioloba*) from Africa and mesquite *Prosopis juliflora*

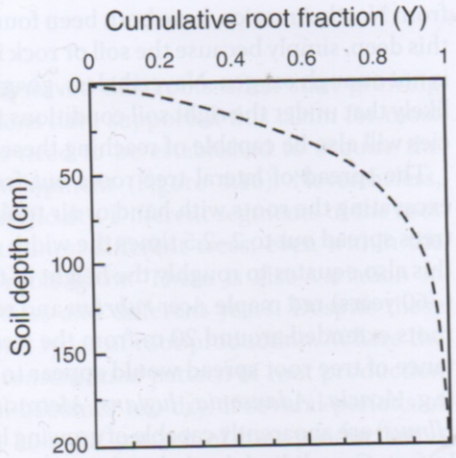

Figure 4.13 The cumulative proportion of root biomass with depth into the soil. The data is an average across trees from temperate deciduous, temperate coniferous, tropical deciduous, tropical evergreen and tropical savannah biomes. *Source:* Adapted from Jackson *et al.* (1996). Reproduced with permission from Springer.

Many arborists learn tree work practices without fully understanding the biological and physiological principles behind them. However, outcomes for the health and longevity of trees are greatly improved when an arborist understands the science behind the care of tree root systems and crowns. In *Applied Tree Biology*, Drs. Hirons and Thomas draw upon their decades of experience in the laboratory, classroom, and the field — as well as the expertise of distinguished contributors to this volume — to provide those responsible for tree care with the scientific information that informs best practices for planting, pruning, soil decompaction, irrigation, and much more.

- Takes a multidisciplinary approach, integrating knowledge from plant biology, physiology, arboriculture, ecology, and more
- Provides a systematic presentation of fundamental tree biology and the scientific principles informing high quality tree care
- Presents accessible scientific information and best practices that help promote the health and longevity of trees
- Reflects the authors' decades of experience as tree biology researchers and educators, as well as their years of professional experience across the globe

Applied Tree Biology is an indispensable source of practical, succinct information on tree biology, physiology, and ecology for professionals and interested amateurs involved with the care of trees. Arborists, foresters, and horticulturists at all stages of their careers will find this text particularly useful.

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