

Root biomass of vegetation in karst terrain of southwestern China

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摘要 In mountainous areas of southwestern China, especially Guizhou Province, continuous, broadly distributed karst landscapes with harsh and fragile habitats can be found. Research indicates that vegetation located in karst terrains has low aboveground biomasses, but belowground biomass measurements are rarely reported. Using the soil pit method, we investigated the root biomass of karst vegetation in five successional stages: grassland, grass-scrub tussock, thorn-scrub shrubland, scrub-tree forest, and mixed evergreen and deciduous forest in Maolan National Natural Reserve, southern Guizhou Province, growing in two different soil-rich and rock-dominated habitats. The results show that roots in karst vegetation, especially the coarse roots and in rocky habitats, are mostly distributed in the topsoil layers (65% on the surface up to 10 cm depth and 24% in 10 cm to 20 cm depth). The total root biomass in all habitats of all vegetation types is 18.77 Mg hm⁻², in which roots in rocky habitat have higher biomass than in earthy habitat, and coarse root biomass is larger than medium and fine root biomasses. Vegetation restoration from grassland to mixed evergreen-deciduous broad-leaved forest significantly increases the root biomass by sevenfold. The root biomass of mixed evergreen and deciduous forest in karst habitat (71.65 Mg hm⁻²) is greater than that of most typical, non-karst evergreen broad-leaved forests in eastern (49.09 Mg hm⁻²) and western (59.37 Mg hm⁻²) subtropical regions of China. This result confirms our hypothesis that plants growing in tiny, shallow soils and rocky habitats of karst terrain allocate more resources to roots to maintain and physically support the ecosystem. However, due to the heterogenetic distributions of soils and roots in karst terrain, and the difficulty in accessing every root in deep underground, root biomass is possibly underestimated in this study. Increased samples of root and soil from larger areas are needed in future studies.

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