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Sub-millimeter surface morphology of Gleditsia triacanthos L. (honeylocust) associated with foliar and bark interception storage capacities

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The study investigates the association between sub-millimeter surface morphology and interception storage capacity of foliar and bark surfaces of Gleditsia triacanthos L. (honeylocust). By integrating laser scanning microscopy, three-dimensional (3D) surface mapping, and laboratory-based storage capacity analyses, we found an association between foliar microrelief and storage capacity across canopy phenophases. For example, the greatest mean surface roughness (173 μm) and storage capacity (0.019 ml cm-2) were observed during the full leaf phenophase. A decrease in foliar microrelief and storage capacity was observed during senescence, possibly from environmentally-induced degradation of the morphological microstructures and epicuticular wax as the surface aged over the growing season. The 3D sub-millimeter morphology and its strong association with interception storage capacity suggests that foliar and bark microrelief facilitates water retention by trapping water in reservoirs formed from microstructures (i.e. trichome projections, vein contours, and valley depressions). Further research should be conducted to explore the mechanisms and processes occurring on aboveground plant surfaces (both foliar and bark) that may promote or inhibit interception storage capacity.

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