

Water storage capacity and wettability of ecosystem elements (plants, woody fragments) from post-fire areas

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Abstract

Fire is a major threat across various forest types because of its effects on the soil's physical, chemical, and biological properties. Burning changes soil acidity, water storage capacity, and nutrient concentration by consuming plant biomass, litter layers, and soil organic matter.

Fires also strongly change the hydrological properties of the forest floor.

The knowledge of the water cycle is crucial for the practical preservation and exploiting their capabilities. Plant wettability is an important parameter characterising the plant's ability to retain water on its surface and is linked to the ecosystems' hydrological and ecological functioning. This research investigates the relationship between leaves and wood wettability based on contact angle measurements and water storage capacity for areas covered by fire last year (B) compared to adjacent areas where there were no fires (U).

The research was conducted in the Los Guajares area. We used photographs and angle measurements in graphic software for the wetting contact angle measurements on the plants' surface, and the weighing method for the plant surface water storage determination.

The results clearly indicate that the average water capacity (mS) decreases with the increase of the contact angle (mCA) of the drops to the surface of both branches and leaves collected on both burned and unburned surfaces.

For woody fragments, branches of dry but unburned mango show the highest water capacity after 24 hours of immersion in water (S₂₄) equal to 1.10 [g g⁻¹] of water. This is confirmed by the fact that dead wood is a great reservoir of water.

Burnt pine wood retained 0.07 [g g⁻¹] of water and fresh mango branches only 0.40 [g g⁻¹]. Burnt pine wood showed a small initial water capacity (S = 0.12 g g⁻¹) but at the same time, the side surface was not hydrophobic because the dripping water did not form drops but soaked in immediately.

The water capacity of leaves of new plants growing on B and U are not statistically

different (on average 0.31 g g⁻¹), while the inclination angles indicate highly wettable for U and wettable for B.

Keywords: Wetting contact angle; Interception; Los Guajares; retention.

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