Geophysical Research Abstracts
Vol. 19, EGU2017-4374, 2017
EGU General Assembly 2017

Stocking rate impact on soil water repellency and erodibility of burnt lands

Ilan Stavi (1) and Eli Zaady (2)

(1) Dead Sea & Arava Science Center, Yotvata, Israel (istavi@adssc.org), (2) Agricultural Research Organization, Gilat Research Center, Israel (zaadye@volcani.agri.gov.il)

Wildfires and prescribed burnings are common, modifying the functioning of geo-ecosystems. Such fires have been extensively studied, and reported to considerably affect soil properties. Yet, understanding of the impact of livestock grazing, or more precisely, trampling, in fire-affected lands is limited. The objective of this study was to assess the impact of livestock trampling (hoof action) on the functioning of burnt vs. non-burnt lands. This was studied by focusing on the effects on wettability and related properties of solid soil, as well as on the quantity of unconsolidated material (detached matter) lying on the solid ground surface. The study was implemented in the semi-arid northern Negev of Israel, in lands which experienced a one cycle of (unintended) low- to moderate-fire severity. The study was conducted by allowing livestock to access plots under high, medium, and low stocking rates. Also, livestock exclusion plots were assigned as a control treatment. Soil wettability was studied by water drop penetration time (WDPT) and critical surface tension (CST) tests. Results show that fire slightly decreased the soil wettability. However, WDPT was negatively related to the stocking rate, and CST was $\sim$13% smaller in the control plots than in the livestock-presence treatments. Also, the results show that following burning, the resistance of soil to shear decreased by $\sim$70%. Mass of unconsolidated material was similar in the control plots of the burnt and non-burnt plots. At the same time, it was three-, eight-, and nine- fold greater in the plots of the burnt $\times$ low, burnt $\times$ medium, and burnt $\times$ high stocking rates, respectively, than in the corresponding non-burnt ones. This study shows that livestock trampling in low- to moderate-intensity fire-affected lands increases the shearing of the ground surface layer. On the one hand, this increases soil wettability. On the other hand, this impact considerably increases risks of on-site soil erosion and land degradation, and off-site environmental pollution.