



Runoff initiation versus runoff yield: Understanding the complexity of the hydrological effect of biological soil crusts

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The differentiation between runoff initiation and runoff yield (amount) is not always clear. In many cases they often seem interchangeable. Some of the differences were pinpointed following research conducted at two sand fields in Israel (Nizzanim, NIM, at the southern coast and Nizzana, NIZ in the Negev) and three sites in the Chihuahuan Desert, New Mexico, USA (silty-loessial sediments at the Jornada Experimental Range, JER; quartzose sand in the Sevilleta Wildlife Refuge, SEV; gypseous sand at the White Sands National Monument, WS) during which intact plots were compared to scalped plots. While the parent material, the effective rain, and the exopolysaccharide (EPS) content of the crust determined runoff initiation in the Chihuahuan Desert, the effective rain and the crust microrelief determined the amount (yield) of runoff in areas where runoff initiation took place. Low EPS-crusts did not facilitate runoff initiation, even at high-chlorophyll crusts such as in WS. Similar results were obtained for NIM. Data from NIZ also highlighted the fundamental role played by the EPS in the determination of the amounts of runoff. This however was not the case with the chlorophyll content per se, that did not determine runoff initiation or yield. The findings also indicate that under the conditions examined, microrelief could not have controlled runoff initiation. Nevertheless, it affected the runoff amounts, as found in the Chihuahuan Desert and the Negev. The presence of rills and gullies may be indicative of the potentiality of BSCs to initiate runoff.