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Discussions

Interactive comment on "Microstructure and hydraulic properties of biological soil crusts on sand dunes: a comparison between arid and temperate climates" *by* T. Fischer et al.

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Although this paper may have potentially made an important contribution, the ms, unfortunately failed to do. The outcome for the ambiguous goals and interesting hypotheses presented by the authors is unfortunately not convincing, for the reasons outlined below: a. The comparison is performed on 5-6 years old crusts in Lieberose (LIE), Germany and 25-30 years old crusts in Nizzana (NIZ), Israel, i.e., between crusts that did not reach maturity (LIE) and mature crusts (NIZ). b. The authors try to reach significant conclusions regarding field processes in LIE and NIZ based on a comparison of the newly established crusts in LIE and the mature crusts in NIZ. While claiming that (hypothesis A) substrate wettability was reduced in LIE, attributing it to the most likely effect of a plant species (Zygogonium ericetorum), and claim that they impede

water from their competitors in LIE, they also claim that (hypothesis B) moss hinder water infiltration and hence impede water from higher plants in NIZ. These are far-reaching conclusions that should be backed up by adequate data, preferentially field data. Unfortunately, this was not the case. c. The authors based their conclusions on lab measurements. Yet, at least as far as NIZ is concerned, their data was based on a total of 5 Petri dishes taken from three habitats along one catena (two replicates from two habitats with cyanobacterial crusts and only one sample from the bottom slope with a moss-dominated crust). It implies that hypothesis B is based on one Petri dish sample. Looking at Fig. 8 and Fig. 9, the authors present higher extra WHC for the cyanobacterial crust at the midslope (Fig. 9), implying that the cyanobacterial crust there (and not the moss-dominated crust) has the most significant effect. Furthermore, given the differences in thickness (unfortunately, this essential data was not presented) the differences in WHC as presented in Fig. 8 are not high, and cannot convince the reader that large amounts of water is held by the crust to the extent that the shrub community will be severely affected. d. In support of hypotheses A, the wettability or repellency of the crusts was monitored. Admitting that the use of the water drop penetration time (WDPT) test "was not applicable. . .because drop penetration was too rapid on all crusts" (p. 12716; l 14-16), the authors adopted another method that shows very slight and unconvincing differences between the samples. Since WDPT is examined under field conditions and since the authors try to convince the readers that crust under field conditions are water repellent, the failure to show it with WDPT calls for attention. Furthermore, no supportive evidence was provided for the proposed mechanism that "water supply to higher plants was limited" (p. 12712; l 21). Contrarily, according to Figure 6, LIE is characterized by high infiltration. e. No reference was made to the repellent crusts reported from the Dutch coast (Jungerius, Pluis) and to field measurements published by Kidron and co-authors regarding rain-runoff-erosion relationship in NIZ, despite the relevance of these papers to the data/hypotheses presented. Thus for instance, when referring to water repellency in LIE or to erosional processes in NIZ, the relevant publications should also be cited.

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