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Characteristics and functions of semi-desert soils in the Negev (Israel) depending on precipitation, relief and vegetation

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The Negev desert in south western Israel has been the subject of several investigations concerning soil forming processes and matter fluxes in desert soils. In order to investigate the influence of the 'global change' on semi-desert ecosystems, study sites along a steep rainfall gradient are of great advantage. The study site "Nizzana 69", which is in the focus of this study, lies about 25 km south of the Mediterranean Sea near the border between Israel and Egypt. The area has an annual rainfall of approximately 170 mm * a-1. A catena consisting of six profiles, three under the legume Retama raetam and three in the bare interspace between shrubs was investigated in order to show the impact of this perennial plant and the relief on soil properties. The results show a strong influence of the shrub due to accumulation of nutrients, carbonates and soluble salts, which were precipitated with dust and rainfall, or which derive from mineralisation of plant litter. The interspace between the plants is covered by a biological soil crust, which also strongly influences the matter fluxes by creating runoff, nitrogen-fixation and stabilizing the soil surface and protecting it against deflation. The distribution of salts and carbonates in the profiles indicate leaching processes. All soils of the study site "Nizzana 69" are weekly developed Arenosols without horizons of carbonate or salt enrichment to a depth of 1 m. The comparison with other areas along the rainfall gradient shows higher inputs of soluble salts with increasing precipitation due to wet deposition, while carbonate contents increase with decreasing precipitation due to deposition of dust, which was generated in the lime stone Negev. On the other hand leaching of soluble soil constituents decreases and accumulation in the upper soil horizon increases with decreasing annual precipitation. Furthermore the importance of local relief aspects for plant growth decreases with increasing rainfall.