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Dryland shrubs: understanding their effects on local hydrology and rainfall partitioning.

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Dryland plants modify the partitioning and fate of rainfall via multiple mechanisms. These include (a) interception of rainfall on the above-ground parts of the plant (b) stemflow funnelling to the base of the stem (c) diversion or interception of overland flow depending on shrub-related mounds or other microtopography (d) plant-induced and plant-related changes to soil infiltrability and macroporosity (e) capture of mist of blowing rain. Further effects on soil moisture then arise from (a) textural modification of evaporation rates from moist soil (b) organic litter modification of evaporation rates from moist soil (c) altered microclimate (shading, sheltering from wind) (d) plant use of soil water. There has not been a full analysis of the magnitude of these various effects. For instance, literature has tended to equate increased infiltrability of shrub soils with increased infiltration, which may not be warranted. For instance, the radiating root systems of shrubs may result in reduced plant cover in interspaces, reduced surface roughness, and increased overall site losses in overland flow. More importantly, most of the processes listed operate in ways that even for a single plant architecture depend on the properties of rainfall events and multiple other factors linked to the markedly variable rainfall climate of drylands. Thus, the results derived from a single program of field observations need to be set in the context of temporal variability of local conditions. Modelling of the combined effects of the processes listed earlier appears to provide the opportunity to explore this variability but it is made difficult by the lack of the required data on multiple parameters for any single field site.