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Water content and water repellency in a field. Implications for irrigation strategies

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The degree of water repellency of soil material depends on its water content. Irrigated soils preferably should be kept sufficiently wet to render the soil wettable, in order to prevent irrigation water bypassing the root zone. But if this leads to overirrigation, the risk of groundwater pollution increases. We applied three irrigation regimes to individual trees in a Eucalyptus plantation on water-repellent soil. The resulting unimodal distribution of shallow water contents produced a bimodal distribution in the degree of water repellency: at any location, the soil would most likely be either wettable, or strongly water-repellent. We developed a procedure to estimate from both distributions the area of wettable soil based on a population of locally determined water contents.