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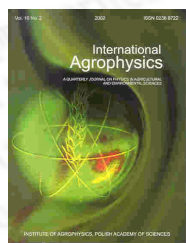
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Possible effects of soil contamination by light non-aqueous phase liquids (LNAPLs) on soil water parameters and their consequences

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abstract In central Germany a loess derived site contaminated with very different light non-aqueous phase liquids (LNAPLs) emanating from production of mineral oils, was evaluated with respect to soil water retention to form an idea on the conditions and possibilities of deep percolation. At 4 subsites, undisturbed cores (100 cm³) were sampled from profile depths ranging between 2 and 9 m. The water retention characteristics and bulk density were determined. Results indicate that in most cases > 50% of the pore volume (PV) is occupied by water held at matrix potentials of \pm -15000 hPa and only about 10% of PV may be occupied by quickly draining water (matrix potential > -60 hPa). LNAPLs strongly decrease the surface tension σ to values ranging from 20 mN \times m⁻¹ to 45 mN \times m⁻¹ and increase the angle of contact α to 20-45° (from literature) as compared to values of 72.75 mN \times m⁻¹ and 0° for pure water. Thus it is almost impossible to derive the correct pore size distributions of the material studied and other contaminated material from the water retention characteristics. The effect of the changed surface tension and angle of contact on the water regime (deep percolation, capillary rise) of contaminated profiles results in an enhancement of deep percolation and a restriction in capillary rise.

keywords water retention, pore size distribution, surface tension, angle of contact, LNAPL-contamination, soil water regime

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