Effects of hydrological processes on surface and subsurface nitrogen losses from purple soil slopes

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Relationships of hydrological processes via surface flow (SF) and subsurface flow (SSF) to nitrogen (N) losses from sloping farmlands have been rarely researched. In this study, laboratory experiments were conducted to investigate ammonia nitrogen (NH4-N), nitrate nitrogen (NO3-N) and total nitrogen (TN) losses from purple sloped soils due to SF, SSF and sediment (S). Effects of rainfalls and slope gradients on N losses were also studied. Three rainfall intensities (0.4 ± 0.02, 1.0 ± 0.04 and 1.8 ± 0.11 mm min-1) and four slope gradients (5°, 10°, 15°and 20°) were designed in experiments. Larger SF discharges occurred with increasing rainfall intensities while SSF was prone to happen under low rainfall intensities. Although r2 of regression results were low, both N loss concentrations and loads coincided positively with discharges except for a negative relation between N concentrations and SF discharges. In comparison, smaller SSF discharges produced substantial N loads with higher N concentrations especially for NO3-N. NH4-N, NO3-N, and TN losses were dominated by S, SSF and SF, respectively. Furthermore, linear increases in loss loads with increasing discharges revealed that distributions of N loss loads were compatible with flow distributions in stormwater. 10° may be a critical slope gradient for SSF discharge and nutrient export.