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紫色丘陵区典型小流域暴雨径流氮磷迁移过程与通量

Transportation processes and loss fluxes of nitrogen and phosphorous through storm runoff in a typical small watershed in the hilly area of purple soil

中文关键词:迁移过程 小流域 暴雨径流 氮磷 初期冲刷效应 壤中流 流域

英文关键词:watershed storm runoff nitrogen and phosphorous first flush effects surface flow

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中文摘要:

对紫色丘陵区盐亭截流小流域2007年3次暴雨径流的全过程进行了连续监测，测定了径流量及降雨—径流过程中氮、磷的形态、浓度与通量变化。结果表明，N、P各形态浓度变化曲线与流量曲线趋势大致相同，总氮(TN)浓度迅速达到峰值后缓慢下降，而后期又略呈上升趋势，硝态氮(NN)浓度变化总体呈上升趋势，颗粒态氮(PN)与颗粒态磷(PP)浓度在径流过程中迅速达到峰值后陡然下降，氨态氮(AN)及磷酸盐(PO43-P)含量较低且波动较小。暴雨径流前期氮素迁移以PN为主，主要来源于地表径流，受降雨强度控制。后期以NN为主，来源于土壤硝酸盐随壤中流淋失。磷素主要以地表径流迁移的PP为主。暴雨径流导致的N、P流失负荷巨大，说明初期冲刷效应明显。

英文摘要:

To understand the hydrological pathways of nitrogen and phosphorus loss in the hilly area of purple soil is crucial for non point source pollution control. Water flows, concentrations and fluxes of N and P through rainfall runoff in three storm rain events were monitored at a small watershed in the central Sichuan Basin, China, in 2007. The results showed that the N and P concentrations responded with discharge flow. Total nitrogen (TN) concentration increased sharply up to the peak, then decreased slowly, and followed a rising trend at the end stage of the runoff; while nitrate nitrogen (NN) increased during the observation period. The concentrations of particulate nitrogen (PN) and phosphorus (PP) rised sharply and then followed by a rapid decline. The low concentrations and small variations were observed in ammonium nitrogen (AN) and phosphate phosphorous (PO3-4P). The PN transported by surface flow was dominated in the early periods of storm runoff, while NN became dominant in the late period, suggesting the importance of subsurface flow transporting of nitrate. The PP caused by surface flow was the main form of phosphorus in storm runoff. The loss loads of N and P in storm runoff were high, with mean loads of TN and TP equal to 4.8 and 0.7 g·m-3 respectively. Based on a (MW) curve, the loads of PN, TP and PP mostly distributed in the early portion of storm runoff, showing first flush effects was important and particulate N and P were transported with overland flow. By contrast, NN loads mainly in the late stage of storm runoff, implying NN was transported by subsurface flow.

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