Influences of surface runoff detachment and sediment transport on insoluble nitrogen and phosphorus loss under two planting methods with Prunella vulgaris

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February 1, 2023

Abstract

A lack of research on sediment displacement has led to a corresponding lack of understanding regarding the movement of insoluble N and P. In this study, we used field simulated rainfall experiments and discovered the following: first, the regulatory effects of the two planting methods on the runoff detachment rate was greater than that on the runoff sediment transport rate, and the influence of rainfall intensity was greater than that of slope. Outside the threshold, the regulatory effects of the two planting methods on runoff detachment and sediment transport on different slope gradients were diametrically opposed. Second, N loss was 10 times higher than P loss during rainfall events. N and P losses were highest on bare slopes, and lowest on slopes on which the *Prunella vulgaris* combined with earthworms planting method was used. N and P loss during rainfall events increased as rainfall intensity increased, and decreased as slope increased. The rate of change increased under high rainfall intensity or slope gradient. Third, regulation of insoluble N loss under the *P. vulgaris*-only planting method was achieved through regulation of runoff detachment and sediment transport, with contribution rates of 23.89% and 31.98%, respectively. Regulation of insoluble N loss under the *P.vulgaris* combined with earthworms planting method was achieved by regulating runoff detachment, with a contribution rate of 66.92%. Regulation of insoluble P loss under the two planting methods was achieved by regulating both the runoff detachment and sediment transport rates.

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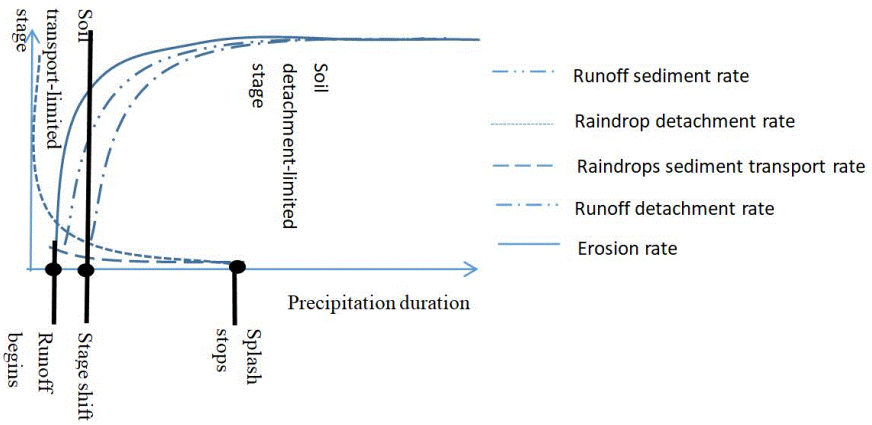
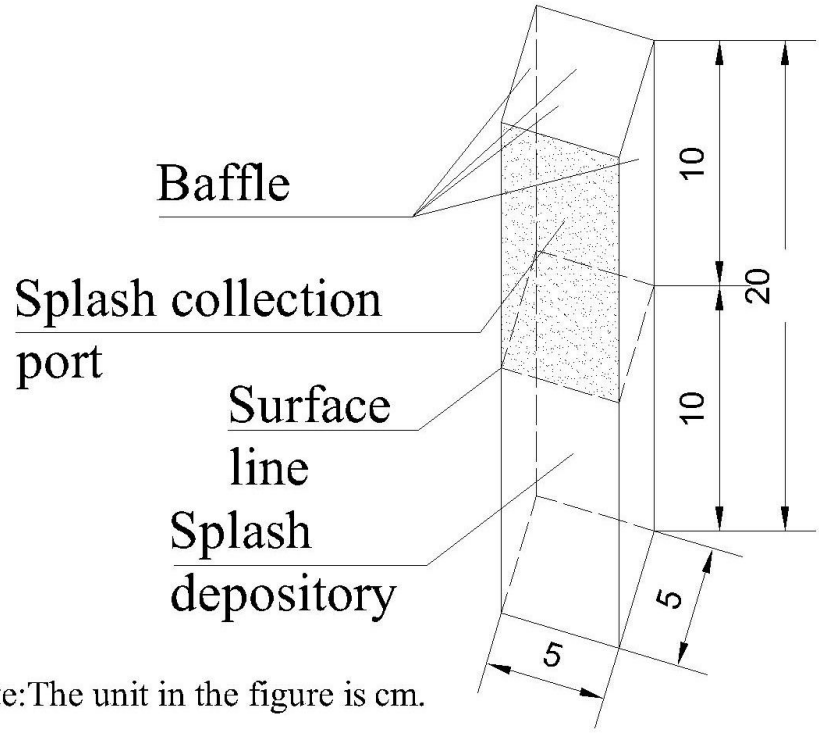
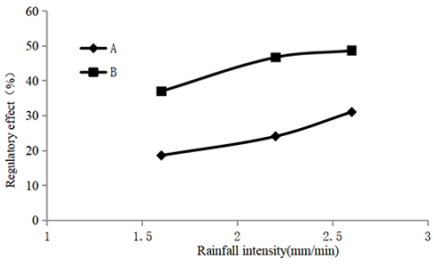
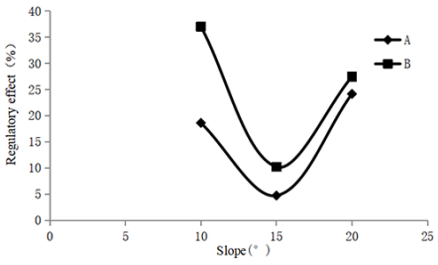
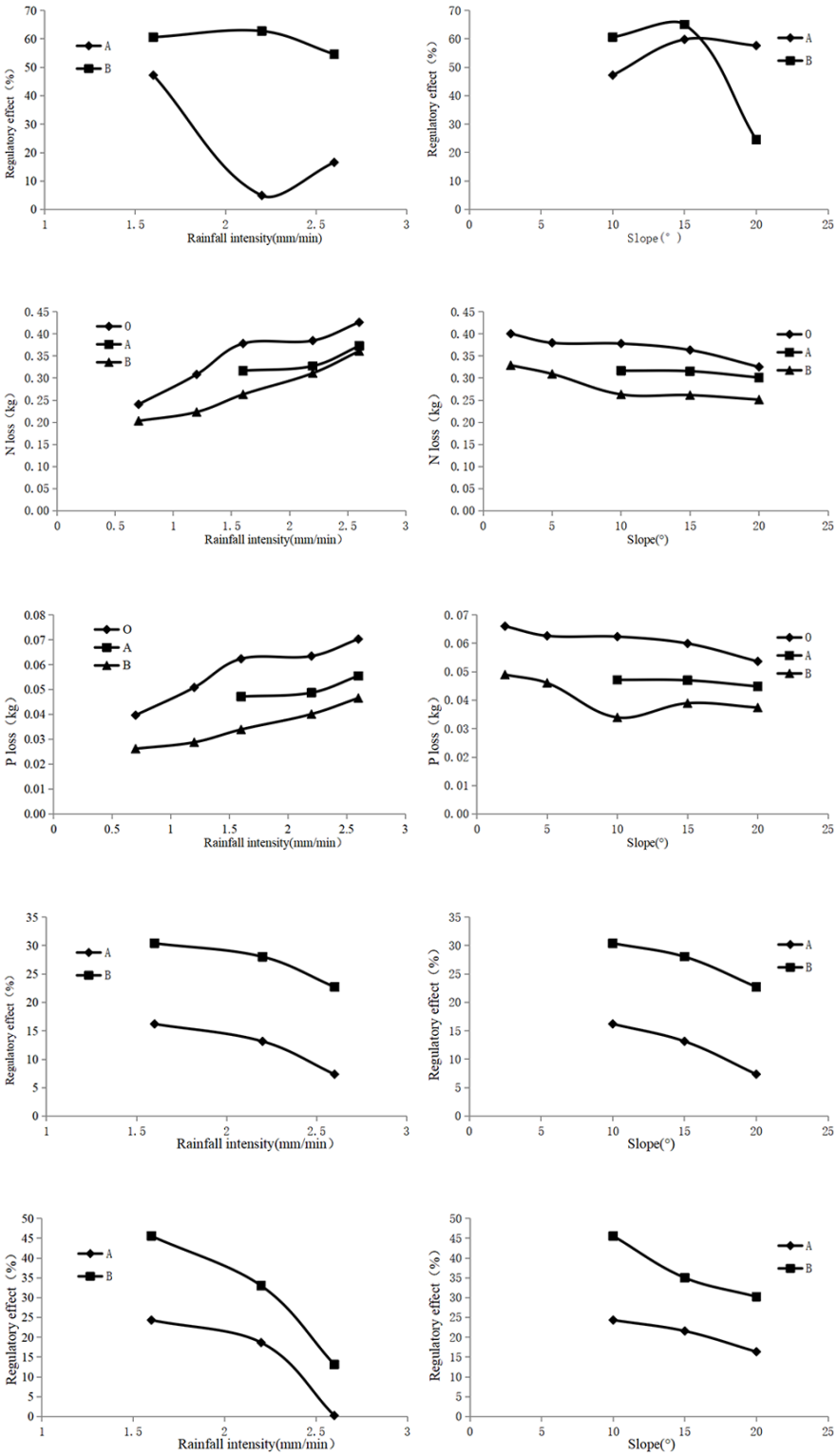




Note:The unit in the figure is cm.







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