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Narrow Grass Hedge Effects on Nutrient Transport Following Manure Application

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Abstract:

The placement of stiff-stemmed grass hedges on the contour along a hill slope has been shown to decrease nutrient transport in runoff. This study was conducted to measure the effectiveness of a narrow grass hedge in reducing runoff nutrient transport from plots with a range of soil nutrient values. Composted beef cattle manure was applied at dry weights of 0, 68, 105, 142, and 178 Mg ha⁻¹ to a silty clay loam soil and then incorporated by disking. Soil samples were collected 243 days later for analysis of water-soluble phosphorus (WSP), Bray and Kurtz No.1 phosphorus (Bray-1 P), NO₃-N and NH₄-N. Three 30-min simulated rainfall events, separated by 24-hour intervals, were then applied. The transport of dissolved phosphorus (DP), total P (TP), NO₃-N, NH₄-N, total nitrogen (TN), runoff, and soil erosion were measured from 0.75 m wide x 4.0 m long plots. Compost application rate significantly affected soil measurements of WSP, Bray-1 P, and NO₃-N content. The transport of DP, TP, NO₃-N, NH₄-N, TN, runoff and soil erosion was reduced significantly on the plots with a grass hedge. Mean runoff rates on the hedge and no-hedge treatments were 17 and 29 mm, and erosion rates were 0.12 and 1.46 Mg ha⁻¹, respectively. Compost application rate significantly affected the transport of DP, TP, and NO₃-N in runoff. The experimental results indicate that stiff-stemmed grass hedges, planted at selected down slope intervals, can significantly reduce the transport of nutrients in runoff from areas with a range of soil nutrient values.

Impact Statement:

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