



Contents lists available at ScienceDirect

International Journal of Sediment Research

journal homepage: www.elsevier.com/locate/ijsrc



Original Research

Soil and onsite nutrient conservation potential of aromatic grasses at field scale under a shifting cultivated, degraded catchment in Eastern Ghats, India

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ARTICLE INFO

Article history:

Received 20 September 2016

Received in revised form

21 November 2017

Accepted 23 January 2018

Available online 31 January 2018

Keywords:

Aromatic grass

Enrichment ratio

Soil loss

Silt

Sediment yield

ABSTRACT

Land degradation due to soil erosion is a global problem, especially on cultivated hill slopes. Economically important aromatic grasses can protect degraded hill slopes more effectively than field crops, but little information is available on their performance. This study quantifies runoff, sediment yield, enrichment ratios of soil and nutrients, and sediment-associated organic carbon and nutrients losses under three aromatic grass species: citronella (*Cymbopogon nardus*), lemon (*Cymbopogon flexuosus*), and palmarosa (*Cymbopogon martini*), compared with a traditional field crop, finger millet (*Eleusine coracana*) grown at three land slopes (4%, 8%, and 12%). It was observed that the degree of slope and type of grass both significantly influenced runoff generation. Runoff and sediment yield (SY) were significantly higher at 12% slope than at 8% and 4% slopes. Relation between rainfall and runoff were significant for all the grass species ($p < 0.05$). Palmarosa, lemon, and citronella grass reduced the SY by 10, 54, and 60%, respectively, over finger millet. SY was also significantly related to rainfall for all the treatments ($p < 0.05$). The threshold runoff values to produce SY were higher for aromatic grasses compared to finger millet. Enrichment of clay, silt, sand, soil organic carbon (SOC), available nitrogen (N), phosphorus (P) and potassium (K) in the sediment were not significantly different between slopes but differed significantly between aromatic grasses and finger millet. Sediment associated nutrient load varied inversely with SY mainly because of the nutrient dissolution effect of high runoff volume. Annual loss of SOC and nutrients varied from 84.7–156.8 kg ha⁻¹ y⁻¹ for SOC, 4.38–9.18 kg ha⁻¹ y⁻¹ for available N, 0.35–0.75 kg ha⁻¹ y⁻¹ for available P, and 2.22–5.22 kg ha⁻¹ y⁻¹ for available K, with the lowest values for citronella and highest for finger millet. The study found that the aromatic grasses have greater environmental conservation values than finger millet on steep degraded land.