ABSTRACT

Simulation Studies to Estimate Soil Loss and Runoff Characteristics for Four Distinct Soils of Trinidad

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Land erosion associated with agriculture production is a serious environmental challenge in Trinidad and Tobago and causes on site loss of top soil which reduces land productivity, and can contribute to pollution of fresh water bodies, resulting in reduce water quality. Few studies have investigated the combined effects of land characteristics, climatological factors and agriculture production on soil erosion. This study used a rain simulator with a 4 x 4 x 3 x 3 factorial arrangement of factors. Combined effects of soil type (Las Lomas, St. Augustine, Maracas and Talparo series), slope gradient (5, 10 and 30%), simulated rainfall intensity (SRI) (25, 60 and 125mmh^{-1}) and vegetative cover (0 days-10%, 5 days-10%, 20 days-60% and 40 days-90%) on soil and nutrient loss from cropped soils was investigated. Sediment(S), ammonium (NH_4), phosphorous (P) and runoff volume (RV) were quantified and data was analyzed using an ANOVA. In the first trial the effects of slope and crop cover were investigated using low simulated rainfall intensity (25mmh^{-1}). Sediment, P and NH_4 loss increased ($P<0.05$) with increasing slope. Sediment loss increased with time at high SRI (125mmh^{-1}; Intensity x time, $P <0.001$). NH_4 loss increased with time at medium SRI (60mmh^{-1}; Intensity x time, $P < 0.001$). The second trial investigated the effects of rainfall intensity and slope. Sediment, NH_4, P and RV losses increased with increasing RI at 0 days after transplanting (DAP; Intensity x time, $P <0.001$). Sediment and NH_4 loss increased with slope at 0 DAP (slope x time, $P<0.05$). The third trial investigated the effects of a rainfall event on the S, P, NH_4 and RV loss. NH_4 increased as slope increased at 0 DAP (time x slope, $P= 0.001$).Results of the current study suggest that the magnitude of the soil erosion during the rainy season is influenced by the intensity of the initial rains, crop cover and slope gradient.

Keywords: soil erosion; ammonium; phosphorous; rainfall intensity; sediment; rainfall simulation