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Evaluation of Runoff and Sediment Trapping Effectiveness of Vegetative Filter Strips in the Riparian Zone of Lake Victoria

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This study was conducted with in the framework of the Lake Victoria Research Initiative (VicRes) and VLIR-OI project with the aim of making contributions to the Diagnosis and Remediation of Land Degradation Processes in the Riparian Zone of Lake Victoria, Uganda in view of reducing sediment pollution of the Lake Waters. The objective of this research was to gain knowledge and asses the performance of Vegetative Filter Strips (VFS) in reducing cropland runoff and trapping sediment in the Lake Victoria riparian zone under natural rainfall and simulated concentrated runoff conditions and to assess the influence of filter widths and vegetation type.

Four vegetative types evaluated include elephant grass (Pennisetum sp), lemon grass (Cymbopogon citratus), Paspalum (Paspalum notatum), and sugarcane (Saccharum officinarum). Runoff plots were established in a randomized complete block design replicated three times at three sites. Filter strip widths were set at 2.5, 5, and 10 m against a standard width of 10 m planted with Zea mays. Data collected included daily rainfall, daily runoff and soil loss for the rainy days and percent vegetation cover. Descriptive statistical analysis and testing for significant differences between mean values using the Mann-Whitney Wilcoxon test were done in SAS Enterprise Guide 4.2. The same runoff plots established to collect data under natural rainfall conditions were used under simulated concentrated runoff conditions. The influence of various factors on the trapping effectiveness under concentrated runoff experiment was analyzed by means Spearman rho correlation coefficient between all measured variables and logistic regression.

The results showed that under natural rainfall conditions, runoff and sediment trapping effectiveness increased with increasing vegetative filter widths for all vegetation types. The differences between vegetation types however, evened out with increasing filter width with filter width of 10 m showing no significant difference. Most sediment is trapped within the first 2.5 to 5 m and widening the strip to 10 m resulted in marginal rise in sediment trapping effectiveness (STE). Under concentrated runoff, initial soil moisture content and vegetation cover were found to have a significantly positive effect ($P<0.01$) on the STE of the VFS in addition to the filter width. STE measured under sheet and rill conditions diminishes considerably when concentrated runoff occurs. Lemon grass and Paspalum grass with minimum filter width of 5 m could be regarded overall as the best option under sheet and rill conditions and concentrated runoff respectively.The results demonstrate that VFS could provide a viable means to reduce runoff and sediment flux from cropland for conditions of relatively small sediment source area.

Key words: Vegetative filter strips, runoff reduction, sediment trapping, vegetation cover