

Effect of Manure Treatment on Furrow Erosion: A Case Study of Sagawika Irrigation Scheme in Kasungu, Malawi

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Abstract : Furrow erosion is the major problem menacing sustainability of irrigation in Malawi and polluting water bodies resulting in death of many aquatic animals. Many rivers in Malawi are drying due to some poor practices that are being practiced around these water bodies, furrow erosion is one of the cause of sedimentation in these rivers although it has gradual effect on deteriorating of these rivers hence neglected, but has got long term disastrous effect on water bodies. Many aquatic animals also suffer when these sediments are taken into these water bodies. An assessment of effect of manure treatment on furrow erosion was carried out in Sagawika irrigation scheme located in Kasungu District north part of Malawi. The soil on the field was clay loam and had just been tilled. The average furrow slope of 0.2% and was divided into two blocks, A and B. Each block had 20V-shaped furrow having a length of 10 m. Three different manure were used to construct these furrows by mixing it with soil which was moderately moist and 5 furrows from each block were constructed without manure. In each block 5 furrow were made using a specific type of manure, and one set of five furrows in each block was made without manure treatment. The types of manure that were used were goat manure, pig manure, and manure from crop residuals. The manure application rate was 5 kg/m. The furrow was constructed at a spacing of 0.6 m. Tomato was planted in the two blocks at spacing of 0.15 m between rows and 0.15 m between planting stations. Irrigation water was led from feeder canal into the irrigation furrows using siphons. The siphons discharge into each furrow was set at 1.86 L/S. The $\frac{3}{4}$ rule was used to determine the cut-off time for the irrigation cycles in order to reduce the run-off at the tail end. During each irrigation cycle, samples of the runoff water were collected at one-minute intervals and analyzed for total sediment concentration for use in estimating the total soil sediment loss. The results of the study have shown that a significant amount of soil is lost in soils without many organic matters, there was a low level of erosion in furrows that were constructed using manure treatment within the blocks. In addition, the results have shown that manure also differs in their ability to control erosion since pig manure proved to have greater abilities in binding the soil together than other manure since they were reduction in the amount of sediments at the tail end of furrows constructed by this type of manure. The results prove that manure contains organic matters which helps soil particles to bind together hence resisting the erosive force of water. The use of manure when constructing furrows in soil with less organic matter can highly reduce erosion hence reducing also pollution of water bodies and improve the conditions of aquatic animals.

Keywords : aquatic, erosion, furrow, soil

Conference Title : ICAES 2016 : International Conference on Agriculture and Environmental Systems

Conference Location : Miami, United States

Conference Dates : March 24-25, 2016