

Grass mulching effect on infiltration, surface runoff and soil loss of three agricultural soils in Nigeria

K.O. Adekalu a*, I.A. Olorunfemi^b, J.A. Osunbitan^a

^a *Department of Agricultural Engineering, Obafemi Awolowo University, Ile-Ife, Nigeria*

^b *Department of Agricultural Engineering, Lagos State Polytechnic, Lagos, Nigeria*

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Abstract

Mulching the soil surface with a layer of plant residue is an effective method of conserving water and soil because it reduces surface runoff, increases infiltration of water into the soil and retard soil erosion. The effectiveness of using elephant grass (*Pennisetum purpureum*) as mulching material was evaluated in the laboratory using a rainfall simulator set at rainfall intensities typical of the tropics. Six soil samples, two from each of the three major soil series representing the main agricultural soils in South Western Nigeria were collected, placed on three different slopes, and mulched with different rates of the grass. The surface runoff, soil loss, and apparent cumulative infiltration were then measured under each condition.

The results with elephant grass compared favorably with results from previous experiments using rice straw. Runoff and soil loss decreased with the amount of mulch used and increased with slope. Surface runoff, infiltration and soil loss had high correlations ($R = 0.90, 0.89, \text{ and } 0.86$, respectively) with slope and mulch cover using surface response analysis. The mean surface runoff was correlated negatively with sand content, while mean soil loss was correlated positively with colloidal content (clay and organic matter) of the soil. Infiltration was increased and soil loss was reduced greatly with the highest cover. Mulching the soils with elephant grass residue may benefit late cropping (second cropping) by increasing stored soil water for use during dry weather and help to reduce erosion on sloping land.

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*Corresponding author. Tel.: +234 8037250823.

E-mail address: koadekalu2002@yahoo.co.uk (K.O. Adekalu).

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